INFORMATION AND COMMUNICATION TECHNOLOGY: KNOWLEDGE, SKILLS AND ATTITUDE OF ARTS AND SCIENCE COLLEGE TEACHERS OF BHARATHIDASAN UNIVERSITY REGION

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DOCTOR OF PHIOLOSOPHY

IN

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by

M. JAMAL MOHAMED JAFFAR

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under the Guidance of

Dr. S. SENTHILNATHAN

Assistant Professor



DEPARTMENT OF EDUCATIONAL TECHNOLOGY

BHARATHIDASAN UNIVERSITY,

TIRUCHIRAPPALLI

December – 2016

Dr. S. SENTHILNATHAN
Assistant Professor
Dept. of Educational Technology
Bharathidasan University
Tiruchirappalli – 620 023.

CERTIFICATE

This is to certify that the thesis entitled **"INFORMATION AND COMMUNICATION TECHNOLOGY: KNOWLEDGE, SKILLS AND ATTITUDE OF ARTS AND SCIENCE COLLEGE TEACHERS OF BHARATHIDASAN UNIVERSITY REGION"** submitted to the Bharathidasan University, Tiruchirappalli for the award of the **Doctor of Philosophy** in **Educational Technology** is a record of original research work done by **M. JAMAL MOHAMED JAFFAR** at the Department of Educational Technology under my supervision and guidance during the period 2010 - 2016 and that the dissertation has not formed the basis for the award of any Degree / Diploma / Associateship / Fellowship of similar title to any candidate of any University.

Tiruchirappalli

Signature of the
Research Supervisor

M. JAMAL MOHAMED JAFFAR
Research Scholar (Part-Time)
Dept. of Educational Technology
Bharathidasan University
Tiruchirappalli – 620 023.

DECLARATION

I do hereby declare that the thesis entitled **"INFORMATION AND COMMUNICATION TECHNOLOGY: KNOWLEDGE, SKILLS AND ATTITUDE OF ARTS AND SCIENCE COLLEGE TEACHERS OF BHARATHIDASAN UNIVERSITY REGION"** submitted to the Bharathidasan University, Tiruchirappalli, in partial fulfillment of the requirements for the award of the degree of **Doctor of Philosophy** in **Educational Technology** is a record of original research work done by me under the supervision and guidance of **Dr. S. SENTHILNATHAN**, Assistant Professor, Department of Educational Technology, Bharathidasan University, Tiruchirappalli and that the thesis has not formed the basis for the award of any Degree / Diploma / Associateship / Fellowship or of similar title of any candidate of any University.

Tiruchirappalli

M. JAMAL MOHAMED JAFFAR
(Research Scholar)

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Chapter – I

Conceptual Framework of the Study

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CONCEPTUAL FRAMEWORK OF THE STUDY

"Mastering ICT Skills and utilizing ICT towards creating an improved teaching and learning environment is of utmost importance to teachers in creating a new learning culture."

- Molly Lee (2008)

1.1. Introduction

Education is the backbone of a progressive nation. Education generally seeks to nourish the good qualities in man and draw out the best in every individual. The teacher occupies a pivotal position in the system of education. The teacher is the kingpin of the educational system, maker of mankind and the architect of the society. The role of a teacher in education is often formal and inevitable. By educating an individual, the teacher attempts to give him/her some desirable knowledge, understanding, skills, interests, attitudes and critical thinking. To teach all students according to today's standards, teachers need to go through the subject matter deeply and flexibly, so that they can help the students to map their own ideas. In this frame of reference, ultimately the teachers try their best to impart knowledge as the way they understood. Thus, any sort of communication methods that serve this purpose without destroying the objective could be considered as innovative methods of teaching. The use of innovative methods in educational institutions has the potential, not only to revitalize education but also to empower people, strengthen governance and galvanize the effort to achieve the human development goal for the country.

The biggest challenge which India has to face in the 21st century is that, the Indian Higher Education system is becoming big and complex. The management of colleges and universities, in this changing scenario, needs to be done in a more professional and efficient manner. It is only here, the paramount importance of Information and Communication Technology – ICT, the buzz

word of the current century, which can only rejuvenate, the Teaching-Learning processes in Higher education, is felt.

1.2. Education: A Bird's Eye View

In the modern age, education is regarded as an essential expenditure and productive investment. Whatever expenditures incurred on educational plans, equipment, buildings and other expenses, are considered to be the investment, the returns of which add up to greater economic welfare of the country.

Modernisation is generally regarded as a process of change, change of traditional society into a society based on Science and Technology. Education and modernization are closely related to each other. Education helps to have modernization and modernization in turn helps to have better education. Kothari Commission (1964-1966) observes, "The progress in modernization will, therefore, be directly related to the pace of education's advancement and one sure way to modernize quickly is to spread education to produce educated and skilled citizens and train an adequate and competent intelligentsia".

In olden days, the teacher was the kingpin, who decided the various facets of teaching and the only method used, was oral communication. The world of today is experiencing two explosions viz. population explosion and knowledge explosion. These explosions have had a tremendous influence on education thereby traditional curricula, methods, organization and even examination system are found irrelevant to the modern age. Therefore, flexibility and multiplicity of media and materials are to be encouraged. Since, the youth are the pillars of the nation, they have to be provided with all kinds of facilities and techniques for effective as well as efficient learning.

1.2.1. Meaning of Education

Etymologically, the word 'Education' has been derived from different Latin words, as follows:

- ‘educare’ which means ‘ to bring out’ or ‘to nourish’.
- ‘educere’ which means ‘to lead out’ or ‘ to draw out’
- ‘educatum’ which means ‘act of teaching’ or ‘training’
- ‘educatus’ which means ‘ to bring up, rear, educate’

All these meanings indicate that, education seeks to nourish the good qualities in a man and draw out the best in every individual. Education seeks to develop the innate capacities of every man. Through education, the individuals get some desirable knowledge, understanding, skills, interests, attitudes and critical thinking. They develop some understanding about the deeper things in life, the complex human relations and the cause and effect relationship and so on. As individuals in the society, they have to think critically about various issues in life and take decisions about them being free from bias and prejudices, superstitions and blind beliefs. Thus, they have to learn all these qualities of Head, Hand and Heart through the process of education.

1.2.2. Indian Education – a Historical Perspective

In ancient India, Monastic orders of education under the supervision of Guru were a favoured form of education for the nobility. The knowledge was often related and imparted to a particular section of the society. In the priest class, the cream sector Brahmins were trained, to teach the remaining classes. The warrior classes, the Kshatriyas were trained in various aspects of warfare. The business class, the Vaishyas were taught their trade and on the other hand the working class - the Shudras were generally deprived of educational advantages.

With the coming of Buddhism, secular institutions cropped up along with Buddhist monasteries. These institutions imparted practical education like medicine, psychological approach and business mathematics etc. A number of urban learning centres became increasingly visible during 200 BC. The important urban centres of learning were Takshashila and Nalanda. These institutions systematically imparted knowledge and attracted a number of

foreign students to study topics such as Buddhist literature, logic, grammar etc. For some period of time, the Indian educational system was ruled by Maktabs and Madarasas as by the influence of Islamic rule in India.

With the arrival of the British empire in India, the modern European education came to India. British Raj was reluctant to introduce mass education system as it was not their interest. The colonial educational policy was deliberately one of reducing indigenous culture and religion, an approach which became to be known as Macaulayism. The system soon became solidified in India, as a number of primary, secondary and tertiary centres for education cropped up during the colonial era.

Following independence in 1947, Maulana Abul Kalam Azad, India's first Educational Minister envisaged the strong central government control over education throughout the country, with a uniform educational system. As a result, several initiatives were taken up to reform the education system in the country by allotting sumptuous fund in every Five Year Plan (Sharma 1996).

As a positive note, the Indian graduates, in all subjects and disciplines have given a new image to India and are accepted at global level as value-added-skilled human power at premier level. Thus, India is now recognized as a nation with a potential to provide 'knowledge creators' and 'knowledge workers' to strengthen both internal as well as the world economy. This signifies the inherent strength of Indian education system.

1.3. Educational Technology

Technology plays a vital role in every sphere of life and education is no exception. Technology has certainly changed the way, the people live. It has impacted the different facets of life and redefined living. Several mundane manual tasks were automated, courtesy to technology. Also, many of the complex and critical processes could be carried out with ease and efficiency, thanks to the manifold positive effects of technology, the field of education has

undergone major changes. The word ‘technology’ comes from the Greek word ‘techne’ which means craft or art. Another word, ‘technique’ with the same origin, also may be used in the field of Educational Technology.

The term ‘Educational Technology’ is often associated with, and encompasses, instructional theory and learning theory. While instructional technology covers the processes and systems of learning, the educational technology includes other systems used in the process of developing human capability. Educational Technology is the study and ethical practice of facilitating learning and improving performance by creating and managing appropriate technological processes and resources.

According to Apter (1968), “Today a technology of education is being developed with the aim not only of making education more widely available but also of improving quality of education which is already available”. The National Policy on Education (NPE -1986) rightly observed, “Educational Technology should be employed in the spread of useful information, training and retraining of teachers, to improve the quality, sharpen awareness, including abiding values etc., both in the formal as well as in non-formal education”.

Eric Ashby (1968) identified the ‘Four Revolutions’ in education as sources of modernisation, as detailed below:

- The first revolution occurred, when societies began to differentiate adult roles and there was shift in roles in the ‘process of education’ from parents to teachers and from home to school.
- The second was, the adoption of the ‘written word’ as a tool of education. Prior to that, only oral instruction prevailed and with great reluctance, writing was permitted to coexist with the spoken word in the class room.
- The third revolution came, with the invention of the ‘printing press’ and subsequent widespread availability of books.

- The fourth revolution in the field of education, was brought by the 'Development in Electronics' notably those involving radio, television, tape-recorder, computers etc. To the electronics world of education, the behavioural scientists also added their contribution viz. concepts of teaching-learning, creating the new phrase 'Educational Technology'.

Educational Technology includes computers and the internet technology which have revolutionized education, but is not limited to, software, hardware, as well as internet applications and activities alone. In particular, with the onset of computers in education, it has become easier for the teachers to render knowledge and for the students to grasp it. The computer technology is used to add a flavour element to education as icing to cake base. It goes without saying that, internet has endowed education with interactivity. Online education and distance learning have given new dimensions to the field of education and higher learning.

1.3.1. Objectives of Educational Technology

Educational Technology provides valuable help, for achieving the best possible results in an economic way through the available human and non-human resources. It has always ambitious agenda. Sometimes it only aims at increased efficiency of effectiveness of current practice, but frequently of pedagogical changes (Timothy Koshmann, 1997).

According to Collins (1992), "Technology provides us with powerful tools to try out different designs, so that instead of theories of education, we may begin to develop a science of education, but it cannot be an analytic science like Physics or Psychology: rather it must be a design science more like aeronautics or artificial intelligence". Educational Technologists would not therefore consider, the computer as just another piece of equipment. Educational Technology is therefore, both a tool and a catalyser and it can become a medium, through which change can happen.

Hilard Jason (1990) states the following as the major objectives of Educational Technology, keeping the teachers as the focal point:

- Transmitting information
- Serving as the role model
- Assisting in the practice of specific skills
- Contributing to the provision of feedback

According to Mc.Kenzie (1999), the following are the objectives, with students as the focal point:

- To reach out to a maximum number of students
- To reach out to them, with an improved range of learning materials
- To offer greater opportunities for independent learning
- To have appropriate students' response

1.4. Information and Communication Technology (ICT)

Information and Communication Technology (ICT) is defined as, "the use of hardware and software for storage, retrieval, communication, diffusion and sharing of information for economic and cultural upliftment". The term ICT was first used in 1997, in a report by Dennis Stevenson to the UK government and promoted by the New National Curriculum Documents for the UK in 2000. UNESCO (2000) considered ICT as, "Scientific, technological and engineering disciplines and techniques used in information handling and management processing, their applications, computers and their interaction with men and machines and associated social, economic and cultural matters".

Asia and Pacific Regional Bureau for Education and Commonwealth of Learning, UNESCO (2004) defined ICT as, "technologies used to communicate and to create, manage and distribute information". In accordance with UNESCO (2010), "ICT is a plural term, which encompasses many technologies including to full range of electronic tools to be used together, record and store information and exchange and distribute information to others".

ICT is often used as an extended synonym for Information Technology (IT), but is usually a more general term that stresses the role of unified communications and the integration of telecommunications, intelligent building management systems and audio systems in modern Information Technology. A broad spectrum of ICTs includes computers, the internet, telephones, television, radio, audio-visual equipments, laptops in wireless connection to the internet, personal digital assistants, video cameras, 3G and 4G cell phones and tablets. Personal computers have integrated large section of the society throughout the world, thereby the concept of 'Global village' has emerged.

ICT is universally acknowledged as an important catalyst for social transformation and national progress. Understanding and leveraging ICT is therefore, critical for the developing countries, striving for continued social and economic progress.

1.4.1. ICT in Higher Education: Role and Significance

The Asian Development Bank (2009) highlighted the role of ICT in education as, "ICT has the potential to bridge the knowledge gap by means of improving quality of education, increasing the quantity of educational opportunities, making knowledge building possible through borderless and boundless accessibility to resources and people and reaching populations in remote areas to satisfy their basic right to education".

In "New Directions of ICT-Use in Education", Blurton (1999) highlighted the UNESCO's World Communication and Information Report which observes, "the increasing use of ICT in education and society will change the nature of the knowledge and skill and the students must acquire 'Information Literacy' in order to compete and contribute in an increasingly ICT dominated global economy ".

In the 21st century, ICT is considered as the most essential tool for enhancing the quality of education. It also facilitates accessibility of best

practices and best course materials and allows the educational institutions to reach the unreached groups and new international academic standards. (Medha Gupta - 2015).

Ulka Tora and Millind Joshi (2012) listed the following five reasons for the integration of ICT in Higher Education:

- Student-centred Learning
- Supporting Knowledge Construction
- Anyplace Learning
- Anytime Learning
- Information Literacy

Onwuagboke and Bede Blaise Chukwunyere (2015) highlighted, the advantages of ICT in Higher Education as

- Increased access to instructional resources via internet
- Share and demonstrate experiences through technologies
- Enhanced access to Higher Education through distance teaching and learning
- Increased flexibility in what to learn, how to learn and where to learn it and
- Motivate the potential learners towards Higher Education.

According to Raju Narayana Swamy (2012), “acquisition of ICT skills in Higher Education institutions facilitates knowledge sharing which will lead to increased educational opportunities for the future and conduct of research; writing assignments, sharing information, collecting data, making documentations etc., by the academic community, are possible only by capturing ICT knowledge and skills”.

Implementing ICT in Higher Education helps to minimize the disparities in educational outcomes between the members of social, racial or ethnic groups based on their different social circumstances or preconceptions about their

potential abilities. It promotes social equity, collaboration, democratic participation of citizens and social integration among persons across the world (Upasana Thaplial - 2013). Democratization of education and bridging the digital divide are only possible with the help of ICT enabled higher education (Raji and Godsy, 2012).

1.4.2. ICT in Education: Negative Perspectives

The early warnings of Cuban (1986, 1993), about the disillusions linked with previous waves of educational technology, about the "fickle romance" that could be observed for each new wave of new technology, had little echo, because the technological tide was powerful and promising indeed.

Two reports published in the USA by the Alliance for Childhood (2000, 2004) are very critical texts against high technology for education, charging educational technologies not only for not having fulfilled the first prophets' claim, but also for putting at risk innocent kids, who hardly have any capacity of insubordination. Interestingly they also express, concern about the possible shameful links between techno-reformer lobbies and ICT corporations.

Consequently, it is plausible to suggest that expecting one single variable, such as putting computers in their classroom, to change teaching practices in a particular way is unrealistic (Killen, 2009). Convery (2009) observed that, making a new (and generic) ICT plan for all teachers discarding each one's uniqueness in teaching and expecting them to respond to it , discounts the knowledge of teaching, leading to continuing wasteful investment, and more importantly waning of teaching interest and benefits already existing in the minds of the teachers.

Fullan (2008) charged that there are always, significant difficulties for teachers to try and match their practices to technologists' unrealistic aspirations. Castells (2010) remarked that, "History has shown that, people do not change their lives to use technology; rather, people use it in ways that fit in

with their lives, needs and interests". Owing to this, teachers under academic stress are always frustrated towards ICT inclusion in teaching.

Sahay (2004) holds strongly that, "ICTs are or may pose a great threat to students' autonomy, which can even be potentially undermined". He equally argues that while others see ICTs as ushering in new and exciting era in education, others argue that ICTs rob education of its traditional association with books and scholarships.

Bekele (2004) made it clear that, ICT usage brings stress, ruins privacy, misuse of intellectual resources and diminishes physical as well as social contacts. Keogh (2001) also noted that ICTs pose some threats to the society like creating social exclusion and creating a society of technological haves and haves not (Technological Divide). It enhances competition in higher education institutions forcing them to reconsider their visions, roles, profiles, positions and make new alliances. According to Wende and Beerkens (1999) the ICT devices are very expensive and generally cause cultural imperialism (Digital Divide).

Khalid Abdullah Bingimlas (2009) observed, "Many in the academia still believe that, it is difficult to completely take away the physical contact between learners and teachers because face-to-face meeting with students is very essential for certain aspects of teaching and learning". With the growing rise of technology, things have changed and moved towards more pessimistic views, keeping aside their so called disadvantages, ICTs still possess a majestic recognition in higher education.

1.4.3. Teachers and Learners in ICT Frame

Educational Technology plays a more imperative role in higher education, to reorient teachers towards the latest developments in their respective fields. Various predictions about changes in teaching neglected to understand that, teaching is not parrot recitation of subjects from rotten

memory, but a complex practice which includes, planning, teaching strategies, assessment, evaluation, learning environments and management (Green, 2009). Above teaching, there are certain dimensions which are less visible, yet are important, like the structures of teaching, the roles of those involved in teaching, the time, place and reason for teaching (Kemmis, 2009). These less visible aspects are slowly built by epitaxial layering of experiences and knowledge over time and ICT handling capacity, so as to establish his/her teaching proficiency (Rivalland, 2007).

Teachers are social subjects and their practice in the classroom is much more complex beyond the level of imagination, than a direct response to the interests of others (Selwyn, 2011). Teaching approaches are better understood as a continuum and it can also be explained as a teacher selecting strategies to support a particular learning situation (Killen, 2009). The selection strategies may be influenced by various factors such as the mandated curriculum, economic organization of the institution or the group of students they are working with (Drenoyianni, 2006). According to Durrant and Green (2000), 'the adoption of ICT by teachers depends on their values and beliefs about the importance of ICT for learning'. Teacher's knowledge of both learners and content is also important, as this knowledge influences teachers' pedagogical practices in relation to ICT.

ICT is a powerful tool for disseminating knowledge and information to the learners and supports independent learning. It facilitates more comfortable, preferable learning environment and motivates the learners to collaborate with others, so that it is assumed to encourage cooperative learning and make complex learning experiences easier (Tearle, 2003). ICT incorporated learning automatically allows the chances for facilitating the learner's skills for communication, problem-solving, creativity, higher order thinking and especially self-confidence (Butzin, 2000).

With the help of ICTs, learners are now capable of browsing electronic materials such as e-textbooks, model examination papers, previous year question papers etc., can also have an easy access to resource persons, mentors, experts, researchers, professionals and peers all over the world. When ICT is appropriately used, it can serve as a vehicle and a platform for meaningful educational reform geared towards a shift from didactic instructionism to constructivism. (Duffy and Jonassen, 1992).

ICT encourages the students to be more active, creates involvement in learning, leads to improve their educational achievement and their performance. Today, students need not necessarily be physically present in classrooms. Many universities offer online education programmes wherein the students can interact with their teachers over the web, access reference materials from the university website and earn degree online. (William Winn, 2002). ICT can be suitable to all kinds of learners because of accessibility of all resources on the internet and the availability of appliances, makes it possible to access different disciplines across the world and the possibilities of networking among teachers and learners (Surya Prakash Bora and Teki, 2013)

Presently, the use of ICT is increasing fast in the teaching-learning process. The reason behind the fast acceptance of the emerging technology is nothing but the easier accessibility of all the resources on the internet for both teaching and learning. It empowers both teachers and students to support and be fit for the development of 21st Century Skills, which include**:** critical thinking and problem solving, communication and collaboration, creativity and innovation, information, media and technology skills and life and career skills (Report of the Partnership for 21st Century Skills, 2002).

1.4.4. ICT Competencies

A general definition of competency is the level of integration of knowledge, skills, and attitudes (Tigelaar et al., 2004). Gupta (1999) defines competencies as, “knowledge, skills, attitudes, values, motivations and beliefs,

people need in order to be successful in a job". Teachers need to improve knowledge and skills to enhance and explore their teaching practices with right attitude. Many of the studies on competencies of teachers focus on their teaching role in the class room rather than their competencies. Several definitions of competency are surprisingly controversial. While most would agree that, competencies include knowledge, skills, and abilities, there is a wide disagreement as to whether other characteristics of teachers' viz. attitudes, motives, general disposition, values, and self-image also represent competencies (Spencer & Spencer, 1993).

Koster et al. (2005) listed pedagogical skills, knowing the students, monitoring and evaluation of learning and development, knowledge of curriculum and content, teamwork, communication, problem solving and understanding the culture as teachers' generic competencies or competencies for teacher professional development. Hansen (2008) proposes teachers' field competence, research competence, curriculum competence, lifelong learning competence, social-cultural competence, emotional competence, communication competence, information and communication technologies (ICT) competencies and environmental competencies as general teacher competencies. Pantic et al. (2010) underlines four core competencies viz., learning competency, social competency, educational competency and technological competency (ICT competency) for attaining professional excellence. All the above definitions have a common terminology – ICT competencies, by which the apex importance of the same could be felt.

The ICT competencies are a set of technology standards that define proficiency in using computer technology in the class room. ICT competencies are based on using tools and technical equipments for teaching, distributing and transferring knowledge. They include any technology that helps to produce, manipulate, store, communicate, and/or disseminate information. It means that the ICT competency is very much important to improve two way communication in teaching-learning process.

The competencies consist of computer related skills grouped into four general domains. (1) Basic Technology Operations (2) Personal and Professional Use of Technology tools (3) Social, Ethical and Human Issues and (4) Application of Technology in Instruction (Awouters, 2008)

1.4.5. ICT Competencies for Teachers

Teaching is a complex activity. Competent teachers can only apply broad, deep and integrated sets of knowledge and skills as they plan for implementing and revising instruction. Technology proficiency (including technical skills and instructional applications) is but one dimension of teacher competence. The acquisition of technology knowledge and skills must be connected with the development of a broader array of competencies. Early attempts to develop technology standards for teachers were isolated from the broader teacher competencies and were focused primarily on technology skills (Brand, 1997).

In the list of basic technology competencies, fundamental skills come first – like managing electronic files, using computerized databases and spreadsheets, sending and receiving e-mail messages and creating documents with graphics. These skills are prerequisites for more advanced skills, such as accessing online resources, creating desktop publishing documents, developing multimedia presentations, selecting and customizing instructional software to fit students' needs, streamlining record keeping and other administrative procedures with electronic tools and observing the correct protocols in sharing intellectual property (Siddiqui, 2010, Begum, 2011).

1.4.6. Standards for Teacher Competencies

The International Society for Technology in Education (ISTE-2000) has reported that different forms of teachers' competencies were largely ignored by the teacher training institutes and the refresher courses for the teachers, and it addressed the technology isolation problem (Katane, Irena et al. 2006). NETS-T Project (National Educational Technology Standards for Teachers) explicitly

describes, what competent teachers should know and should be able to do with technology in the context of broader teacher competencies. The NETS-T standards are as follows:

1. Technology operations and concepts,
2. Planning and designing learning environments and experiences,
3. Teaching, learning and the curriculum,
4. Assessment and evaluation,
5. Productivity and professional practice and
6. Social, ethical, legal and human issues.

Among these, technology stands first. Thus, techno-talented teachers are the need of the hour. (Howey et al., 1999).

Anderson (2008) called competencies in three domains as 'applied ICT literacy', namely: a technical domain (related to the basic skills needed to use ICT), a knowledge domain (which refers to the use of ICT with a particular knowledge-related purpose) and an information literacy domain (related to the capacity to access, evaluate and use information).

1.4.7. Major Obstacles in the Inclusion of ICT in Teaching

Pelgrum (2001), Mumtaz. S. (2006) and Khalid Abdullah Bingimlas (2009) identified the following major obstacles towards the inclusion of ICT in Teaching:

- Lack of ICT - oriented teachers
- Lack of enthusiastic nature of teacher towards the usage of ICT
- Lack of ICT based learning materials
- Lack of technical support
- Lack of motivation
- Lack of awareness on ICT benefits
- Lack of mindset to work in ICT mediated environment
- Lack of top-level commitment for the progress in ICT integration
- Lack of systematic method of ICT implementation

- Poor fund allocation in the budget
- High cost of bandwidth
- Requirement of bulk initial investment
- Requirement of heavy fund allocation towards maintenance
- Non-availability of necessary ICT policies
- Improper evaluation in integration of ICT tools in teaching
- Need for sparing extra time and effort to integrate ICT tools by both teachers and taught
- Fast changes in ICT tools
- Insufficient ICT knowledge and skills of both the teachers and taught
- Rare conduct of ICT skills training programmes
- Poor network connectivity
- Poor Tele-density
- Intermittent supply of electricity

1.4.8. ICT Initiatives in Indian Higher Education

India needs a large number of talented youth with higher education for the task of knowledge acquisition, knowledge imparting, knowledge creation and knowledge sharing. However, research findings have shown that, the overall state of higher education is dismal in the country. Socioeconomic, cultural, time and geographical barriers exist in front of people who wish to pursue higher education. Innovative use of ICT can only potentially solve this problem. Adoption of ICTs in education requires establishment of infrastructural facilities, acquisition of technologies and their periodic updating, management and professional support services. In India, some of the private and public bodies have taken the following initiatives for inclusion of ICT in education.

- In 1984, the UGC started the Countrywide Classroom programmes to disseminate education through television.
- In 1993, the UGC started Consortium of Educational Communication (UGC – CEC) - a nodal agency to coordinate, guide and facilitate ICT activities at National level.

- Gyandarshan was launched in 2000, to broadcast educational programmes.
- The National Programme for Technology Enhanced Learning (NPTEL) was launched in 2001, as a joint initiative of IITs and IISC to promote education through technology.
- India is the only country to have launched a satellite (EDUSAT – Education Satellite) during 2004 by ISRO, for education purpose exclusively.
- In 2004, Vyas Channel, UGC – CEC's Higher Education Satellite Channel of MHRD was established.
- IGNOU in 2005, launched, 'e-Gyankosh' to preserve, digital learning resources.
- Eklavya - uses internet and television to promote distance learning in basic Sciences and Engineering.
- IIT-Kanpur has developed Brihaspati, an open source e-learning platform.
- Premier institutions like IIM-Calcutta have entered into a strategic alliance with NIIT for providing programmes through virtual classrooms.
- Jadavpur University is using a Mobile Learning Centre for knowledge dissemination.
- Indira Gandhi National Open University (IGNOU) uses radio, television and internet technologies for enriching their students' learning.
- IIT-Bombay has started the programme of CDEEP - Centre for Distance Engineering Education Programme, using real time interaction.
- The UGC has initiated, "ICT for Teaching and Learning Process" for achieving quality and excellence in Higher Education.
- The UGC has started, Information and Library Network - INFLIBNET, for coordinating the link between ERNET and different universities.

- 'UGC-INFONET' is a network of Indian universities and colleges, for integrating ICT in the process of teaching, learning and education management.
- Gyanvani, is an exclusive FM radio to broadcast programmes of IGNOU and IITs.
- Network Resource Centres were set up by UGC, to encourage universities, colleges and other learning institutes to promote better incorporation of ICT in curricula to prepare the next generation of citizens for better adaptation in IT environments
- National Mission on Education through Information and Communication Technology – NMEICT was started, to provide the opportunity for all the teachers and experts in the country, to pool their collective wisdom for the benefit of every Indian learner and thereby reducing the digital divide.

Ajit Mondal (2012), Rumpa Das (2012), Sharmila Devi et al., (2012) and Salima Jan (2014).

1.4.9. National Mission on Education through Information and Communication Technology (NME-ICT)

The National Mission on Education through Information and Communication Technology (NME-ICT) is a centrally sponsored scheme to leverage the potential of ICT, in teaching and learning process in Higher Education institutions in anytime and anywhere mode. This was expected to be a major intervention in enhancing the Gross Enrolment Ratio (GER) in Higher Education by 5%. The three cardinal principles of Education Policy viz. Access, Equity and Quality could be served well by providing connectivity to all colleges and universities, providing low cost and affordable access-cum-computing devices to teachers and students and providing high quality e-content free of cost to all. The NME-ICT encompasses all the three elements.

1.4.9. a. Need for National Mission on Education through ICT

For India to emerge as a knowledge super power of the world in the shortest possible time it is imperative to convert our demographic advantage into knowledge powerhouse by nurturing and honing our working population into knowledge or knowledge enabled working population. Human Resource Development would certainly be the key for it to happen. Fortunately, the ICT as a tool in education is available at this juncture. A budget allocation of Rs.502 crores was made in 2008-09 for the National Mission on Education through ICT. It is a momentous opportunity for all the teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner and, thereby, reducing the digital divide. For this, what is needed is a critical mass of experts in every field working in a networked manner with dedication. Although disjointed efforts have been going on in this area by various institutions/organizations and isolated success stories are also available, a holistic approach is the need of the hour. The NME-ICT seeks to support such initiatives and build upon the synergies between various efforts by adopting a holistic approach.

It seeks to bridge the digital divide, i.e. the gap in the skills to use computing devices for the purpose of teaching and learning among urban and rural teachers/learners in Higher education domain and empower those, who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

1.4.9.b. Cardinal Philosophy of the Mission

There are three guiding philosophies viz.

- No talent of the country should be allowed to go waste.
- All the services available through the content delivery portal Sakshat should be free.
- Freely available material on the web should be used so as to avoid reinventing the wheel.

1.4.9.c. Objectives of the Mission

The content portion of this Mission would have an ambitious vision of catering to the learning needs of more than 50 crores Indians students and of providing a one stop solution to all the requirements of the learning community. In order to bolster our knowledge resources, to obtain and maintain the competitive edge in the world, a system of identification and nurturing of talent and lifelong learning is required. Such a system would be developed in a cost effective manner over a period of time, integrating, inter–alia the following objectives:

- Effective utilization of intellectual resources.
- Any-time availability of desired knowledge.
- Platform for sharing of ideas and techniques and pooling of knowledge resources.
- Nurturing of scholars and learners.
- Support to all the learners for any of their perceived learning needs.
- Extensive leveraging of the advancements in the field of ICT for taking the knowledge resources to the door steps of the learners.
- Providing Digital/Information Literacy for teacher empowerment.
- Providing e-books & e-journals, utilizing the repository of contents generated so far and the automation of evaluation processes.
- Use of e-learning as an effort multiplier for providing education to every learner in the country.

It is clear that NME-ICT has a nuclear aim of spreading Digital Literacy for teacher empowerment and bridging the Digital Divide in teaching – learning community in Higher Education. It is obvious that emphasis on ICT which is a crying need as it acts as a multiplier for capacity building efforts of educational institutions without compromising the quality.

It is against the backdrop of such a massive initiative for ICT integration in Education in India, the present study assumes greater importance.

1.5. ICT Knowledge

ICT Knowledge is one of the key variables of the present study. Knowledge of ICT is the basic need for anyone who is a debut to the field of Information and Communication Technology. It boosts the confidence of a person to work with ICT tools. It has various stages and dimensions. Achievement of basic knowledge is inevitable to have an entry and subsequent developments lead to the smooth sailing in effective ICT – Pedagogy Integration.

1.5.1. Knowledge

Knowledge is the lowest level of intellectual ability and requires only that one knows what is being communicated. With this fundamental understanding, a person is able to translate or rearrange the information without distorting its original meaning. In order to attain the next level, he/she must be able to apply the appropriate abstraction (i.e. theory, principle, idea or method) without being prompted. Knowledge is the capacity of understanding the relationship between pieces of information and what to actually do with the information.

1.5.2. Types of Knowledge

Knowledge is of three types: personal, procedural and propositional. It is the last of these, propositional knowledge that primarily concerns philosophers. These three types contribute to their level best for the better understanding of the subject concerned.

The first kind of knowledge is personal knowledge or knowledge by acquaintance. This is the kind of knowledge that one claims to have the familiarity of certain things.

The second kind of knowledge is procedural knowledge or knowledge how to do something. People who claim to know how to do certain things are not simply claiming that they understand the mere theory involved in those

activities. Rather, they are claiming that they actually possess the skills involved to do those activities.

The third kind of knowledge, the kind that philosophers care about most, is propositional knowledge or knowledge of facts. When a person says, "I know that the sum of the internal angles of a triangle is 180 degrees", it means that he/she possesses complete understanding of the concept of triangle. It shows that he/she claims to have propositional knowledge.

1.5.3. ICT Knowledge: Need for the Teachers

The outburst of technology makes everyone to live with technology. Even laymen live with advanced technology. The bitter truth is everyone uses technology without perfect knowledge and understanding of the technology they use. It always will lead towards chaos. Hence, it is imperative for every individual to have perfect ICT Knowledge. Such a need for ICT Knowledge is more pronounced in the case of teachers who work with knowledge.

1.5.4. Contribution of ICT Knowledge towards use of Technology

Owing to ICT knowledge one can obtain certain achievements in technology

- One can learn about the hardware and software of computer systems and how these can be used to meet entertainment, personal and business needs.
- One can learn about a variety of software package and programmes and how to choose the most appropriate programme for a specific task.
- One can learn how to work with information data to meet specified business needs which covers data structures, storage and how one can transfer data between different media.
- One can develop an understanding of the risks of ICT and how to prevent these risks by following sensible e-safety guidance.

1.6. ICT Skills

Skill is as much important as Knowledge or even more than that. Even the earliest forms of education revolved around 'Know how', i.e. acquisition of practical skills on the part of the learners. The focus of education was shifted to 'Know what' i.e. Knowledge much later only.

The present day education system focusses not only on knowledge and skills but also many other things. With regard to Information and Communication Technologies in Education, which is integrated across all disciplines, teachers' ICT Skills are of key importance, as effective ICT integration into teaching-learning cannot happen without teachers who have some basic ICT Skills.

ICT Skills is another variable involved in the present work. It reveals the capability of a person to perform a task related to ICT. It finds prime importance in their professional esteem. Unless or otherwise a teacher is equipped with necessary ICT Skills, he/she cannot sustain in the 'digital globe'. In this juncture, it is apt to quote the words of the eminent scientist-cum-educationalist Dr. A.P.J. Abdul Kalam, "India can become one of the developed countries in the world by the year 2020, if we adopt technology as our tool. For this, the teaching community should change its mindset and enthuse the students by means of technology". Thus a teacher with appropriate ICT Skills can only impress and lead their students in the 'ICT Highway'.

According to Laura Turner (2005), the 20 technology skills every educator should have are as follows:

- Word Processing Skills
- Spreadsheets Skills
- Database Skills
- Electronic Presentation Skills
- Web Navigation Skills
- Web Site Design Skills

- E-Mail Management Skills
- Digital Camera Operating Skills
- Computer Network Skills
- File Management and Windows Explorer Skills
- Skills for Downloading Software from the Web
- Skills for Installing Computer Software onto a Computer System
- Web CT or Blackboard Teaching Skills
- Videoconferencing Skills
- Computer-related Storage Devices Operating Skills
- Scanner Operating Skills
- Skills on the operation of PDAs
- Web Skills
- Skills to deal with Educational Copyright
- Computer Security Skills

Against this background, the present study has taken ICT Skills of the Higher Education teachers as one of the key variables.

1.7. Attitude towards Inclusion of ICT into Teaching and Learning Process

- Attitude is the readiness to react towards or against some situation, person or thing in a particular manner.
- Attitude is a personal disposition common to individuals but varying in degrees, which impels individuals to react to object, situations or predispositions in ways that can be called favorable or unfavorable.
- Attitude presents individual feeling for or against something. In other words the degree of feeling of favorableness or unfavorableness towards some objects, person, groups and ideas is called attitude.

1.7.1. Definition of Attitude

According to Allport (1952), "An attitude is a mental and neural state or realness, organized through experience, exerting a directive or dynamic influence upon the individual's response to objects and situations, with which he is regularly related".

According to Sargeant and Williamson (1957), "Attitude is a fairly consistent learned tendency to behave in a certain way towards persons, objects and situations"

Warren (1912) defines attitude as the specific mental disposition towards an incoming experience where by that experience is modified. According to Antony David (1975) attitude is an enduring judgment or set of beliefs that makes an individual ready to respond in a particular manner. Thus an attitude is a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to objects and situations with which he/she is related.

1.7.2. Major Characteristics of Attitude

- It is a learned behavior and it is not inherited.
- It is more or less permanent for a responsible period of time.
- It is directed towards an object or a goal.
- They are essential components of one's personality.
- They represent the behavior of individuals.

1.7.3. Methods of Measuring Attitude

- The direct questions are asked to know the idea of the persons.
- The checklists are prepared and given to the interviewer. From the answers the attitude of the person could be judged.
- The rating scales are used to measure the attitude.
- Special tests like Seagram analysis and Situational test are used to measure the attitude.

- Besides these, Standardized attitude scales like Turnstone's scale of equal appearing intervals and Likert's method of summated rating are used to measure the attitude.

One of the key variables of the present study is Higher Education teachers' attitude towards integration of ICT into Teaching and Learning, simply put as 'ICT Attitude'. The rationale behind taking ICT Attitude as the key variable of the present study is that without teachers' favourable attitude towards ICT, no initiatives for ICT integration into Education will be successful whatever be the availability of infrastructure.

In the context of the present study, an attempt has been made to find out the attitude of the Arts and Science College teachers of Bharathidasan University region towards the use of ICT into Teaching-Learning process. ICT integration into curriculum is complex as internal and external factors play an important role. Amongst the internal factors, attitude of teachers and students towards integration of ICT play a vital role. Even though many teachers have necessary ICT Knowledge and Skills concerned, the integration of ICT into education is difficult because of a simple reason that the teachers' rigidity and reluctance owing to the absence of required attitude. It is thus clear that availability of ICT Knowledge and ICT Skills alone cannot lead to the above mentioned task; only a favorable attitude on the parts of the teachers and learners can ensure it. Hence, the present study has focused its attention on ICT Attitude and appropriate tools have been used for collecting data in this regard.

1.8. Statement of the Problem

The technological wave sweeps through the world in unprecedented speed, making unimagined transformations across all human enterprises. Information and Communication Technologies (ICTs) have fundamentally changed the way people learn, communicate, and do business. They can transform the nature of education – where and how learning takes place and the

roles of students and teachers in the learning process. Today, the world of education stands loaded with unprecedented hope for a new paradigm of 'anytime anywhere learning' through collaborative and constructive pedagogical models, thanks to the all-new web technologies. The so-called 'Knowledge Media' i.e., the World Wide Web has changed how teachers teach and students learn in the classroom.

Teaching successfully with emerging technologies requires on the part of the 21st century teachers a spirit of experimentation, willingness to engage learners in the creation of learning resources (co-creation of content), willingness to "let go" of control and content presentation approaches to teaching and tolerance to failure in attempts to master the digital age pedagogy which revolves around acquisition of certain vital e-competencies. Considering the pivotal role of teachers in ICT enabled teaching in mind, it is of prime importance to analyse the Information and Communication Technology Knowledge, Skills and Attitude: (ICT-KSA). An understanding of the ICT-KSA of higher education teachers becomes essential for curriculum planners, policy makers and educational administrators. In this backdrop, the present study attempts to assess the Information and Communication Technology Knowledge, Skills and Attitude of the Teachers of Arts and Science Colleges affiliated to Bharathidasan University. Hence, the problem of the study is stated as, **"Information and Communication Technology: Knowledge, Skills and Attitude of Arts and Science College Teachers of Bharathidasan University Region".**

1.9. Objectives of the Study

The objectives of the present study are

- To find out the level of ICT Knowledge of Arts and Science College teachers of Bharathidasan University region.
- To find out the level of ICT Skills of Arts and Science College teachers of Bharathidasan University region.

- To find out the level of ICT Attitude of Arts and Science College teachers of Bharathidasan University region.
- To find out the significance of difference, if any in the Knowledge of Arts and Science College teachers of Bharathidasan University region, with respect to certain select variables.
- To find out the significance of difference, if any in the ICT Skills of Arts and Science College teachers of Bharathidasan University region, with respect to certain select variables.
- To find out the significance of difference, if any in the ICT Attitude of Arts and Science College teachers of Bharathidasan University region, with respect to certain select variables.
- To find out whether there is any significant correlation between the ICT Knowledge and ICT Skills of Arts and Science College teachers of Bharathidasan University region.
- To find out whether there is any significant correlation between the ICT Knowledge and ICT Attitude of Arts and Science College teachers of Bharathidasan University region.
- To find out whether there is any significant correlation between the ICT Skills and ICT Attitude of Arts and Science College teachers of Bharathidasan University region.

1.10. Hypotheses of the Study

In the light of the above objectives, the following hypotheses were formulated:

- The teachers of Arts and Science Colleges of Bharathidasan University region do not have any ICT Knowledge.
- The teachers of Arts and Science Colleges of Bharathidasan University region do not have any ICT Skills.
- The ICT Attitude of teachers of Arts and Science Colleges of Bharathidasan University region is unfavourable.

- There is no significant difference in the ICT Knowledge of teachers of Arts and Science Colleges of Bharathidasan University region, with respect to certain select variables.
- There is no significant difference in the ICT Skills of Arts and Science College teachers of Bharathidasan University region, with respect to certain select variables.
- There is no significant difference in the ICT Attitude of Arts and Science College teachers of Bharathidasan University region, with respect to certain select variables.
- There is a no significant correlation between the ICT Knowledge and ICT Skills of Arts and Science College teachers of Bharathidasan University region.
- There is a no significant correlation between the ICT Knowledge and ICT Attitude of Arts and Science College teachers of Bharathidasan University region.
- There is a no significant correlation between the ICT Skills and ICT Attitude of Arts and Science College teachers of Bharathidasan University region.

1.11. Methodology of Research

This study is an attempt to find out the Information and Communication Technology Knowledge, Information and Communication Technology Skills and Information Technology Attitude of the Arts and Science College Teachers of Bharathidasan University region towards Integration of ICT into Teaching and Learning. The study is quantitative in its method i.e., descriptive research involving normative survey. 667 teachers serving in 43 Arts and Science Colleges of Bharathidasan University region were selected through Stratified Random Sampling technique.

The following tools developed and validated were used by the investigator

- ICT Knowledge Questionnaire (ICT-KQUEST)
- ICT Skills Assessment Scale (ICT-SAS)

Besides these, Attitude towards the Use of Information and Communication Technology (ICT) in Teaching Scale (ATUITS), developed by Rajasekar (2014) was also used for collecting data. In addition, a General Information Questionnaire was also used for collecting baseline data. The collected data were subjected to percentage analysis, mean and standard deviation, 't' test, 'F' test (ANOVA), correlation analysis and regression analysis.

1.12. Operational Definitions of the Terms

There are certain key terms, use with specific meaning. In the context of the present research, as detailed below:

'Information and Communication Technology (ICT)' refers to the hardware and software for storage, retrieval, communication, diffusion and sharing of information for economic and cultural upliftment.

'ICT Knowledge' refers to an individual's intellectual ability to explain, organize, analyse, assess and synthesize Information and Communication Technology related concepts and his/her capability of understanding the relationship between pieces of information regarding ICT and what to actually do with them.

'ICT Skills' refers to an individual's learned capacity acquired through practice – the ability to do something in Information and Communication Technology which lead towards handling different categories of hardware, basic operating systems productivity software tasks, and internet use with confidence.

'ICT Attitude' reflects perceptions of value, appreciation, and confidence regarding Information and Communication Technology which are learned tendencies, incorporating affective and behavioural dimensions.

1.13. Limitations and Delimitations of the Study

The investigator has put his efforts to assess the Information and Communication Technology (ICT) Knowledge, Skills and Attitude of the Arts

and Science College Teachers of Bharathidasan University region. The concepts of ICT Knowledge, ICT Skills and ICT Attitude are quite complex in nature. Although all the aspects of these complex phenomena have been taken into account, there is a minor possibility that a few aspects of them could have been left unnoticed. Thus the study is limited.

The delimitations of the study are as follows:

- The study was confined only to the teachers of Arts and Science Colleges of Bharathidasan University.
- The study has been taken up with only 667 teachers of 43 Arts and Science colleges of Bharathidasan University region as sample due to the constraints of time and geography.
- Though there are a variety of tools and techniques available for data collection, only questionnaire and scale were used as tools and the study is only quantitative by nature.

1.14. Organization of the Thesis

The thesis contains five chapters as detailed below:

The first chapter introduces the research study besides providing a conceptual framework of the study.

The second chapter presents a review of the conceptual and research studies which have been completed in abroad and India in the area taken for the study.

The third chapter deals with procedures of research adopted for the present investigation.

The fourth chapter presents the analyses and interpretations of the data.

The fifth chapter summarises the findings of the study and suggestions and recommendations that emerge from the findings.

Chapter – II

Review of Related Studies

CHAPTER - II

REVIEW OF RELATED STUDIES

"A survey of related literature is necessary for proper learning, execution and developing right concepts of the problems and solutions. It provides guiding hypotheses, suggestive methods of investigation and comparative data for interpretation purpose"

- Good (1959)

2.1. Introduction

A literature review is a description of the literature relevant to a particular field or topic. It gives an overview of what has been said, who the key writers are, what are the prevailing theories and hypotheses, what questions are being asked and what methods and methodologies are appropriate and useful. As such, it is not a primary research in itself; but rather it reports on other findings.

A study of related studies implies locating, studying and evaluating reports of relevant researches, study of published articles going through related portion of encyclopaedia and research abstracts.

Conducting a literature review is a vital component of the research process. Familiarity with previous research and theory in the area of study can help in conceptualizing the problem, conducting the study and interpreting the findings. Review of related literature is an important aspect of every research study. It serves multiple purposes and is essential for a well-designed research study. It is a valuable guide in defining the problem, recognizing its scope and significance, suggesting relevant hypotheses, gathering devices, making appropriate study design and sources of data. For most scholars and scientists, crucial analysis of the related literature serves as a stimulus for thinking and creativity. Further, the research worker needs to acquire current information about related studies that have been done in the particular area.

According to Best (1986), "A summary of the writings of recognized authorities and previous research provides evidence that the researcher is familiar with what is already known and what is still unknown and untested".

"The value of any single study is derived as much from how it fits with and expands on the previous work as from the study's intrinsic properties. If some studies seem more significant than others, it is because the piece of the puzzle they solve or the puzzle they introduce, is extremely important, not because they are solutions in and of themselves" (Cooper, 1998).

The review of the literature is an exacting task, calling for a deep insight and clear perspective of the overall field. It is crucial step which invariably minimizes the risk of dead ends, rejected topics, rejected studies, wasted effort, trial and error activity, oriented towards approaches already discarded by previous investigators and even more importantly erroneous findings based on a faulty research design.

2.2. Literature Review: Purpose and Significance

A literature review serves several purposes as follows:

1. To provide the reader with an up-to-date account and discussion of the research findings in a particular topic. It helps to learn about the ways the other people have constructed their own research projects.
2. To detect conflicting points of view expressed by different authors. These conflicting points of view might be the indicators of diverging theories within the same topic.
3. To discuss relevant research carried out in the same topic. The researcher's work is to summarize and discuss the major documents published on a particular topic over a stated period of time
4. The reviewer may also discuss materials published in other fields which are related to the main topic. This process is very important since very often research in the social science is multidisciplinary, i.e. knowledge gets generalized from many disciplines and needs to be integrated.

The review of the related literature allows the researcher to acquaint himself/ herself with current knowledge in the field or area in which he/she is going to conduct the research and serves the following specific needs:

- The review of related literature enables the researcher to define the limits of his/her field. It helps the researcher to delimit and define his/her problem.
- By reviewing the related literature the researcher can avoid unfruitful and useless problem areas.
- Through the review of related literature, the researcher can avoid unintentional duplication of well-established findings. It is no use to replicate a study when the stability and validity of its result have been clearly established.
- The review of related literature gives the researcher an understanding of the research methodology which refers to the way the study is to be conducted. It helps the researcher to know about the tools and instruments which proved to be useful and promising in the previous studies. The advantage of the related literature is also to provide insights into the statistical methods through which validity of result is to be established.

Review of related literature can help the researcher in the following ways.

- It shows how another researcher handled a similar problem.
- It suggests a method or technique of dealing with similar problem.
- It reveals new sources of data which the researcher may not have known.
- It introduces the researcher to experts whose work may not have been known before.
- It helps the researcher to see the study in a historical perspective and in relation to others' efforts in solving the same or similar problems.

- It provides new ideas and approaches which may not have occurred to the researcher before and
- It helps the researcher to evaluate the researcher's effort by comparing it with the effort made by others.

The review of related literature facilitates the investigator to be familiar with ideas, concepts, theories, hypotheses and interpretations. The researcher can select those areas in which positive findings are very likely to add to the knowledge in a meaningful way. The final and important specific reason for reviewing the related literature is to know about the recommendations of previous researchers listed in their studies for further research.

An investigator who ignores prior researches and the relevant theories has the possibility of duplicating a study already done or repeating others' mistakes. The goal of research i.e., contributing to the knowledge base of the field may then never be realized.

In this chapter, an attempt is made to highlight the procedures and findings of some of the researches conducted earlier that have a bearing on the present study. Keeping these important features of a review in mind, only those studies that are relevant, competently executed and clearly reported are included. The purpose of this review is to appraise how the contribution of these studies have made to the fund of information currently available. It presents a comprehensive account of a number of foreign studies related to the theme of investigation. It also presents some of the Indian studies, related to this investigation.

It is to be mentioned here that an attempt was made to present the reviews, classified under different heads viz., Studies related to ICT Knowledge, Studies related to ICT Skills and Studies related to Attitude towards ICT integration into Teaching and Learning. But, the investigator could not bring the reviews under such absolute categories, for one simple

reason – i.e., very few studies focused on these variables in isolation. Most of the studies had at least two of the three variables under study viz., ICT Knowledge, ICT Skills and ICT Attitude. Hence, the related studies, reviewed by the investigator are presented here in the classical model under two categories viz., Studies conducted abroad and Studies conducted in India.

2.3. Review of Research Studies conducted abroad

Wong Su Luan et al., (2005) conducted a descriptive study, to assess the existing levels of ICT competencies among the academic staff of University Putra Malaysia (UPM). A total of 109 (58 males and 51 females) academic staff were involved in this study. Specifically, it investigated the existence of differences between females and males in terms of eight components (word processing, spreadsheets, databases, presentations, electronic mail, World Wide Web, multimedia and virtual class applications) related to ICT. This study has shown the existence of a narrow gap between female and male academicians at UPM in terms of their ICT skills. In certain applications, the competencies of female staff have even surpassed those possessed by males. This could possibly be due to the fact that the majority of female academicians, who participated in the study, were younger than their male counterparts. This finding reflected that of an earlier research by Jennings et al., (2001), which showed that younger age has been found to be associated with more positive attitudes towards ICT.

Al-Ansari (2006) studied the level of computer literacy of the teachers from four colleges (Arts, Social Sciences, Sciences, and Engineering) of Kuwait University. A structured questionnaire, developed and validated by the investigator was used for data collection from half of the 491 potential participants selected as the sample, with a response rate of 62.6%. The study revealed that a large majority of the teachers have been using the computer as well as the internet for more than five years and they were found to possess required level of ICT exposure. Among them, the teachers from Engineering and Science stream ranked top in the time spent in internet usage and in their

ICT skills. They used, e-mail, search engines and WWW resources mainly for communication, research and publication. As many as 19% of Arts, 21% of Social Science, 47% of the Science and 63% of Engineering teachers recorded that ICT tools are inseparable from teaching. They were of the view that ICT has helped them to save time and find up to date information, thereby exhibiting high level of positive attitude towards ICT.

The study of **Anthonia Maduekwe (2006)** sought to determine the perceived obstacles to the use of ICT in education in different universities of Nigeria. An open end questionnaire comprising 20 items, each structured on a five point Likert scale was used and supplanted with unstructured interview session. The participants in this study were lecturers from four Nigerian universities, two from the South Western Nigeria and two from the South Eastern Nigeria. The responses from the participants were analyzed with descriptive statistics. Lower degree of ICT competence among the lecturers was profiled. Surprisingly, attitude, culture and psychology as variables did not contribute much to the obstacles towards the domestication of computer technologies which negated previous research by Nwagwu (2006), who noted that if lecturers were to successfully adopt the use of technologies in their lectures, they ought to possess positive attitudes.

Garcia-Valcarcel Munoz-Repiso et al., (2006) conducted a research in University of Salamanea, Spain to find out the degree of use of audio visual, computer and telematics tools on the part of lectures by the lecturers from the areas of Arts, Humanities and Social Sciences, through a structured questionnaire. Lack of ICT knowledge and skills to work with internet, portals, web pages, electronic manager, search engines, preparation of power points and usage of virtual platform etc., were identified as the barricades. Lecturers with less years of experience were found to handle the tools with ease. Male lecturers were found to perform better than the female lecturers. The female teachers were found to pay greater importance to educational competencies other than the usage of ICT than their male counterparts.

Anne Berit Fuglestad et al., (2007) attempted to measure the ICT capability of the Mathematics teachers as well to test how ICT tools could be utilized in teaching Mathematics and in particular how ICT could support inquiry approaches in teaching and learning. It was identified that the teachers had fundamental theoretical ICT knowledge to the level of requirement but they dawdled in certain key sectors of ICT skills. Their minimal exposure towards the hands-on training programmes was identified as the main reason for their limited use of ICT.

Carla Teixeira Lopes (2007) evaluated the e-readiness among the professors of Escola Superior de Tecnologia da Saude do Porto (ESTSP), a Portuguese Allied Health Sciences Higher Education Institution running courses viz. Biophysics, Biomathematics, Biostatistics, Bioinformatics, Biochemistry, Bio-molecular Sciences and Radiation Physics. A standard questionnaire was applied to gather information from 29 ESTSP's full time professors, about ICT usage and skills, access to equipment and e-learning experience. Evaluation was done manually for all professors with a web server account. Though almost all the faculty members were found to possess moderate ICT skills and knowledge, the findings revealed that a majority of them (72.4%) never had any experience with e-learning.

The study of **Kiruthika Ragupathi et al., (2007)** tried to identify the benefits, motivators and barriers to the use of technology based resources at National University of Singapore (NUS). The five year study on faculty adoption of internet integration at the Northern Michigan University (2004) was selected as the basis for the study. Questionnaires were mailed to 1721 full time faculty members, among whom, 486 members responded to the survey (28% response rate) either through campus mail or through the web-based survey. Gender factor did not mark its importance in their IT standard. Faculty with experience of less than 10 years and faculty in 30-40 years age

group were found to possess high standard of IT Knowledge and operating skills.

Philip Olu Jegede et al., (2007) investigated the relationship between ICT competence and attitude as well as attitudinal constructs of higher education teachers. 467 teachers were selected from five colleges of education and five universities. The selected teachers cut across all the subject discipline as well as professional status. Computer Competence Scale (CCS) developed by the Board of Studies of New South Wales, Australia and Computer Attitude Scale (CAS) developed by Selwyn (1997) and modified by Soh (1998) were utilized and the obtained data were analysed using multiple regressions. Findings revealed the presence of significant relationship between attitude and competence. It was observed that as teachers' positive attitude in turn aroused their interest to develop their computer skills.

Prachit Intaganok et al., (2008) conducted a survey on the ICT competence levels of the lecturers of the Surinda Rajabhat University of Thailand. From the responses of the lecturers, moderate level of ICT knowledge and poor level of ICT skills significantly associated with higher level of anxiety regarding ICT use were identified. Skill levels in ICT were not significantly related to staff age, subject specialization, gender and years of teaching experience but to their access to the personal computer and internet connectivity. Negative attitude of the lecturers towards ICT was related to higher levels of anxiety.

Through a survey, **Archibong et al., (2009**) explored ICT usage and challenges among academic staff of Cross River University of Technology (CRUTECH). As many as 80 academic staff were drawn from a population of 230 serving in CRUTECH through the accidental method. The researchers used the Information and Communication Technology Questionnaire (ICTEQ) The results revealed that 59 academicians (72.5%) were found to be lacking in the ICT operational knowledge and skills and they registered this handicap as one among the key obstacles to ICT usage. Worthy of note is the fact that,

55(68.75%) of the academic staff indicated that lack of interest was not an obstacle to their ICT usage. Almost all the academic staff (99%) were willing and ready to participate in any course, seminar and workshop about technology usage for their upliftment. Thus, the academic staff in CRUTECH were found to possess keen interest in acquisition of ICT knowledge for their future academic performance.

Bingcang (2009) conducted a study to measure the profile of teachers within the Philippine Science teaching system. It looked into two major classifications of teachers—subject taught and campus location in relation to the teachers' ICT competence. The study explored into the significant differences between teachers within the mentioned major classifications of teachers in terms of ICT, as measured by the National ICT Competence for Teachers. Inferential statistics (t-test) was used to identify the relationship of subjects taught and campus location to the teacher's ICT competence. The study revealed the significant difference between Humanities and Science teachers and the absence of the significant difference between rural and urban campuses both in terms of ICT competence. Experimental involvement of Science teachers was attributed as the main factor for their high ICT profile. Based on the findings, the researcher proposed recommendations for teachers, administrators, curriculum writers and policy makers for complete ICT integration.

Junhong Liu (2009) attempted to investigate the college non-English majors' attitude towards the integration of Information and Communication Technologies into English learning. Negative attitude towards ICT orientation persisting among the teachers was put in the front as the main reason for the poor integration of ICT in English learning, which was due to fear on commitment of grammar mistakes, pronunciation problem and lower level of ICT exposure. The investigator analyzed the factors required for possessing positive attitude and provided some constructive information and suggestions for the adoption of technology in foreign language education. The result of this

study went in agreement with previous researches on the factors affecting perceived ICT attributes, cultural perceptions of ICT, computer experience and ICT confidence.

Nan Wang (2009) investigated the use of ICT in teaching at Capital Normal University (CNU), China from the teachers' perspective. As many as 136 teachers were included in this survey. Attitude towards the use of ICT in teaching and difficulties in implementing ICT in teaching were investigated. With regard to data collection, 128 valid questionnaires were received with 94% return rate. Most of respondents showed positive attitude towards the utilization of ICT in teaching: on the other hand 20% teachers represented a neutral or negative attitude. As many as 70% of the respondents recorded that they acquired ICT skills only from their colleagues and not through any training programmes. The survey showed that the majority of respondents required to learn advanced computing skills as they possessed already the basic ICT skills, whereas only a few needed to learn basic operating skills regarding e-mail and Internet.

Philip Olu Jegede (2009) conducted a research on age and ICT related behaviours of higher education teachers in Nigeria in relation to their use. As many as 467 university teachers of Nigeria, participated in the study, the sample selection made use of stratified random sampling procedure with institutional type as stratification factor. The selected teachers cut across all professional status, subject discipline and age groups. Selwyn-soh ICT Attitudinal Scale, ICT Competence Scale, ICT Use Checklist and a questionnaire were used for data collection. The collected data were analyzed with ANOVA and Chi-square test. The study has shown no attitudinal difference across age groups. It showed no correlation between the type of use to which teachers put ICT, the time spent with ICT as well as ICT competence and age.

Terasa Guash et al., (2009) conducted an online survey with seven web-based focus groups with 70 teachers from 16 Universities of Europe, to estimate their level of ICT competencies to survive in the advanced online learning environment. In Delphi Method of Interaction Analysis 78 European experts with ICT expertise discussed with the participants who registered the dire need of updates of ICT tools in education. The study revealed high achievements of highly motivated young teachers with less years of teaching experience. The debut teachers have recorded their voluntary involvement in the inclusion of ICT tools in their teaching.

The survey research of **Ijeoma Aniedi Archibong et al., (2010)** examined ICT competence and challenges to ICT usage among academic staff of Universities in Cross Rivers State, Nigeria. Six research questions were posed to guide the study and a questionnaire was developed, validated and used for data collection from a sample size of 300 academic staff. The collected data were analyzed using descriptive statistics. The results showed that, even though majority of the academic staff had their personal laptops, they had access to internet only via public cyber café. A majority (53.3%) of the respondents rated their ICT competence as low. In terms of ICT usage, the highest areas of competence were in research, e-mail and word processing. Inadequate ICT facilities, excess work load and funding were identified as major challenges to ICT usage among academic staff. Recommendations made included, funding of ICT training of academic staff by the university management and making ICT training mandatory for all academic staff.

Kourosh Fathi Vajargah et al., (2010) conducted a research at the Shahid Beheshti University, a National University of Iran, to estimate the ICT literacy level among its professors. Through stratified sampling technique, 231 professors were selected and from their responses to the items in the questionnaire, the medium level of ICT competencies persisting among them was exposed. The results showed the link between the professors' increasing average of age and their reluctance to use computers in education. Thus the

age of the professors was found to be an influential factor in the level of ICT competencies.

Nafiz Zaman Shuva (2010) conducted a survey research in the School of Arts of University of Dhaka, Bangladesh, which revealed a moderate level of ICT competencies among the teaching faculty. It was identified that only 13% of the faculty were found to be possessing high level ICT competencies. He recommended the University authority to urgently form Information and Communication Technology Curriculum Integration (ICTCI) Task Force to enhance the ICT standard of the faculty and ensure availability of adequate technical infrastructure, in all the departments.

Onasanya et al., (2010) surveyed the attitude of lecturers towards integration of ICTs in institutions in Kwara State, Nigeria. A 29-item questionnaire was administered to 150 lecturers (90 males and 60 females). The findings showed that gender has no effect on the attitude of lecturers towards integration of ICT into teaching and research in tertiary institutions. Science discipline lecturers' attitude towards ICT integration was higher than that of non-science discipline lecturers. Less experienced lecturers were more exposed to the use of ICT than moderately and highly experienced lecturers. Many senior lecturers lacked adequate training and competence in using computer as a tool. It was recommended that higher education institutions should encourage their lecturers to be computer literate by organizing conferences, seminars and workshops.

Urska Sesek (2010) carried out a survey among the Faculty of Arts in University of Ljubljana, Slovenia, two years after the introduction of a web-based learning environment (WBLE) to support the delivery of its programmes. The aim of the research was to profile the use of the WBLE as well as to assess its impact. The research consisted of two parallel online surveys one for the higher education teachers and the other for their students. The e-learning achievements of the teachers were analyzed by their responses to the

questionnaire provided. Despite some restrictions on the interpretation and generalization of the results, the research provided important insight for planning of future action. Low ICT scores of the teachers and high ICT scores of their students revealed the then scenario of teaching-learning process.

Alcuin Mwalongo (2011) examined teachers' perceptions about the use of ICT tools for teaching, administration, professional development and personal use in Tanzania. As many as 74 teachers were involved in the study. Data were collected through an online survey using Survey Monkey and analyzed using Weft QDA in the form of percentages. Results indicated that, the level of ICT handling skills of the teachers was adequate and the teachers used ICT in a wide range for teaching, administration, professional development and personal use but not to radically change their pedagogical practices. The frequency of use of ICT was influenced by ICT access to them and the competence of ICT use was influenced by training. Future research on classroom observations to ascertain the actual use of ICT was also suggested.

The study of **Mohamed Khaleefeh Muflih et al., (2011)** aimed at examining the adoption of ICT amongst faculty members at Jordan University of Science and Technology (JUST). The study further sought to identify JUST faculty members' ICT adoption categories according to Roger's adoption theory and the motivation factors that could affect their ICT adoption. As many as 193 faculty members (163 males and 60 females) teaching in JUST were selected by multi-stage random sampling approach. A questionnaire with 0.95 Cronbach alpha coefficient and a structured interview were used to gather the required information. Findings revealed that JUST faculty members had low to high levels of ICT skills in accordance with what incorporated ICT in their instruction. This study also revealed the higher level of ICT skills of male faculty than female faculty. The largest proportion of the JUST faculty members in this study identified themselves as early adopters of ICT in instruction.

Oye et al., (2011) conducted a pilot study among the academicians employed at the University of Jos Plateau state, Nigeria, which focussed on the awareness, adoption and acceptance of ICT innovation in higher education institutions. The survey tool consisted of 23 survey questions based on Unified Theory of Acceptance and Use of Technology - UTAUT model and 9 demographic statements totaling 32. One hundred questionnaires were administered for data collection. The analysis revealed that although the use of ICT was mandatory, the level of adoption among the university academic staff was still low. Lack of ICT knowledge stood first among the challenges to ICT usage among academic staff, along with no opportunity for training, inability to acquire personal ICT facilities, non-availability of ICT facilities at workplace, insufficient time due to workload and lack of time for practice. Recommendations made were that, all employed teachers in Federal, State and Private universities should undertake mandatory training and retraining on ICT programmes, to provide them with practical and functional knowledge of computer, internet and associated areas of ICT for improved effectiveness and efficiency.

Paz Prendes et al., (2011) of University of Murcia, Spain conducted a research on University teachers' ICT competence and tried to evaluate the indicators based on a pedagogical model. The main objective of the work was to categorize the university teachers with respect to their level of ICT competence. ICT teachers' competence was estimated at three progressive levels of expertise, among which the teachers in level-1 were to have skills related to base knowledge of the common use of ICT in university work, teachers in level-2 were to have skills related to design, implementation and evaluating activities using ICT and teachers in level-3 were to have skills related to the reflection and critical analysis of the actions and activities carried out using ICT either individually or collectively with other teachers. The findings showed that major percentage of teachers stood in level-2 and a minor percentage of teachers reached level-3. The researchers presented the process

of building, developing and validating a catalogue of indicators to analyze, evaluate and promote the ICT competence of university teachers corresponding to their ICT skill level. The work proposed different measures for ICT skill up-gradation, based on an integrated and comprehensive model to enhance the same.

Saeed Ahmadi et al., (2011) investigated the influence of technology involved in teaching and learning. In order to gather information, a questionnaire containing six sections (personal data, software knowledge, skills and attitude, university atmosphere and self-confidence) was used. Samples were selected through random-cluster method from the faculty members of instructor and assistant professor cadres of both sex, from different branches of Islamic Azad University in Fars Province. The results showed that, there was no significant statistical difference between female and male instructors with respect to software knowledge, skill and attitude. Faculty of Assistant Professor cadre were found to possess positive software attitude while compared to instructor cadre faculty.

The College of Human Sciences in University of South Africa conducted a research survey under **Denzil Chetty (2012)** for estimating the ICT competencies of the teachers. A total of 132 academics participated, representing all departments within the college. The research highlighted the ICT competence status of the teaching faculty, the types of ICTs currently being used in the college, the frequency of use, how they were used in teaching and learning practices. The challenges encountered by the teaching faculty owing to their low level of ICT knowledge as well as skills and their remedial measures were recorded.

Mehran Mokhtari et al., (2012) conducted a research work for estimating the ICT knowledge, skills and attitude of professors of Islamic Azad University, Iran and to provide strategies and methods for updating the ICT knowledge and skills of them. As many as 315 full time professors and part

time faculty of both genders, were involved in this research who responded to a questionnaire. The results revealed that the professors had high degree of attitude towards ICT but moderate knowledge and skills on ICT. The study also offered different solutions for improving their ICT knowledge and skills.

Mohamed Abdelaziz Elsaadani (2012) conducted a survey to check the role of gender in deciding the attitude towards ICT among the teaching staff in Egyptian higher education institutions. Validated questionnaire was used for data collection and the responses from 412 teachers as study sample were collected and subjected to statistical analyses. From the results, it was found that the observed 't' was not significant, thus indicating no difference between males and females with regard to their attitude towards ICT. Mean of males was slightly higher than that of females, revealing that, male teaching staff were slightly better than female staff in their ICT attitude.

Uchendu et al., (2012) studied the availability and usage of ICT in teaching and research as well as ICT skills of lecturers of Cross River State Universities in Nigeria. Descriptive survey research design was adopted; a stratified random sample of 500 lecturers were drawn out of the population of 1,556 lecturers. Data were collected with the instrument titled "Lecturers' Usage of Technologies for Teaching and Research Questionnaire-LUTTRQ". The collected data were analyzed with population t-test statistics. The researchers identified moderate ICT skills among the lecturers and recommendation was submitted to the authorities for the necessity of encouraging the lecturers for improving their ICT status.

Ching Sing Chai et al., (2013) investigated ICT integration from the framework of Technological Pedagogical Content Knowledge (TPACK). TPACK is the type of integrative and transformative knowledge that teachers need for effective use of ICT in teaching. TPACK framework addresses the problem arising from overemphasis on technological knowledge in many ICT courses that are conducted in isolation from teachers' subject matter learning

and pedagogical training. The researchers estimated the TPACK of the teachers in the higher education institutions of the North American region. Studies conducted to date employed varied and sophisticated research methods and they have yielded positive results in analyzing teachers' capability to integrate ICT for instructional practice. The researchers suggested more development and research of technological environments based on TPACK with other theoretical frameworks related to the study of technology integration.

Daniela Alexandra Crisan et al., (2013) conducted a research on the preparedness of the teachers of entrepreneurship education programmes, in incorporating ICT in the content delivery. The teachers selected were found to possess low level of computer skills but with required attitude. The findings revealed a framework having a binding aspect of three forces viz. the world of the entrepreneurs, the contemporary ideology of university to possess ICT knowledgeable teachers and the world of the students.

The government of Kenya appointed technical support teachers called as ICT champions in ESP – ICT project for capacity building of teachers in the area of ICT integration in to curriculum. Since the ICT champions were in touch with teachers throughout the implementation of this programme, the study of **Enos Kiforo Ang'ondi et al., (2013)** sought to find out their views on teachers' perceptions and attitudes on the integration of ICTs and their use. The investigator prepared a questionnaire and e-mailed to 20 randomly selected champions (ten men and ten women) on their Google groups' forum for data collection. The findings revealed that although teachers were enthusiastic about ICT integration, there were several challenges that were still holding them back from fully utilizing the ICTs. Low level ICT knowledge and skills of the teachers were identified. The neutral attitude of the teachers towards ICT was indexed. The observations showed that many teachers had a thinking that they were not knowledgeable enough to use ICTs competently and they lacked the skills to manage an ICT integrated class sufficiently and the feeling of teachers

that ICT was an additional botheration to their already existing huge academic burden.

Ly Thanh Hue et al., (2013) conducted a descriptive-survey research, to determine lecturers' attitudes towards ICT integration into the curriculum and its use in the classroom. The research questions sought to measure the frequency of ICT use in teaching and learning among lecturers, their attitudes towards ICT integration into the curriculum to improve teaching and to determine if a correlation existed between lecturers' attitudes towards ICT integration into the curriculum and their ICT use in the classroom. As many as 109 lecturers of Vietnam Public University participated in this survey. The results of the correlation analysis identified a slightly moderate positive relationship between lecturers' attitudes and their ICT use in the classroom. Although ICT was not highly used, lecturers recognized the benefits of ICT that they had chosen to incorporate into their teaching. The researcher advocated that these findings could be used for future research to promote positive educational changes through the integration of ICT into the curriculum in universities.

Mohamed Abdelaziz Elsaadani (2013) executed a random sampling research survey through the use of the questionnaires among the Full time teaching staff of the Egyptian Higher Education Institution. The study sample was 412. Analysis of Variance (ANOVA) showed a significant difference between age and the attitude towards ICT. Greater differences in data produced a larger Chi-square value which led to greater probability for the significant difference. Pearson correlation among age and attitude towards ICT was positive and significant, which supported the relationship between age and attitude towards ICT.

The purpose of the study of **Olibie et al., (2013)** was to appraise the awareness and use of Information and Communication Technology by Home Economics teachers in Anambra State of Nigeria. Four research questions were

formulated to guide the researcher in carrying out the study. A sample of 234 Home Economics teachers participated in the study. The data collection instrument was a 35-item questionnaire. The findings indicated that there was a low extent of teachers' ICT awareness. The researchers identified that the teachers did not use ICT facilities in Home Economics curriculum delivery owing to their least exposure towards ICT. The findings also revealed some strategies perceived by the Home Economics teachers for improving their use of ICT in curriculum delivery. Principals, Heads of Home Economics departments and supervisors from the State Education commission were directed to sensitize Home Economics teachers on the potentials of ICT for curriculum delivery.

Otunla (2013) examined the information literacy skills of University lecturers in relation to ICT tools and resources that are applicable to faculty development such as; e-learning, e-mail communication, interactive multimedia, electronic discussion groups, discussion forum and emerging technologies. The study involved a total of 142 participants randomly selected from five Universities located in two geo-political zones: South West and North East in Nigeria. The findings revealed higher information literacy skills among university lecturers regarding ICT tools and resources related to research and publishing. Findings further inferred that, participants were technologically capable in line with UNESCO ICT-Competence Standards for Teachers. The study recommended adoption of computer-mediated professional development by academic institutions, professional bodies and associations. It also suggested e-mentoring among academic staff with collaborative efforts in technology adoption within and among universities and inter-university institutions for professional development.

Pablo Cesar Munoz Carril et al., (2013) designed a non-experimental quantitative survey to estimate the pedagogical competencies of the university teaching staff associated with the use of e-learning, through an online questionnaire sent via electronic media to 1458 teaching staff (512 female and

946 male) of Coruna University, located in the north-west of the Iberian Peninsula of Spain. Each item was assessed on a 5-point Likert scale to collect the teacher's perceptions and understanding. The inferential analysis concluded that, the level of proficiency was higher for the hired teachers (younger teachers with less teaching experience who taught face to face and dealt with higher pressure regarding training to consolidate their careers in the Spanish University System). The teachers with more teaching experience in virtual environments, regardless of their administrative category, were identified to possess higher level of pedagogical competences. On the contrary, neither the administrative category in the scientific environment nor teaching experience in virtual environments registered significant differences regarding training needs.

Saeed Ahmadi et al., (2013) attempted to investigate ICT application in teaching and learning processes. The sample was selected using clustered-random technique from the faculty members of the branches of Islamic Azad University in Fars province. To collect data, a questionnaire containing five sections (personal information, knowledge, skill, approach and self-confidence), was used. The results revealed that the faculty members' approach to ICT with the regression coefficient of 0.42 at 0.001 level of significance was the most predicting factor in creating self-confidence in the faculty members to use it, the next were knowledge of software with the regression coefficient of 0.39 at 0.001 level of significance and software skill with the regression coefficient of 0.22 at 0.005 level of significance. Irrespective of teaching experience and sex, the approach of faculty members to software was identified as the most predicting factor in creating self-confidence in them to use ICT in their teaching.

Yusuf Musibau Adeoye et al., (2013) carried out a research in six randomly selected tertiary educational institutions in South west Nigeria. These included two Universities, two polytechnics and two Colleges of Education. A structured questionnaire titled Information Communication Technology as a

change Agent Questionnaire was developed and validated. The questionnaire was administered to fifty members of academic staff in each of the six sampled tertiary institutions, making a total of three hundred. The results showed the existence of significant relationship between the type of tertiary institutions of the academic staff and their level of awareness and the university professors were found to possess higher level of ICT awareness, while compared with teachers of Polytechnic institutions and the teacher educators. It also confirmed the absence of significant relationship between the gender of the academic staff and their perception of effectiveness of ICT utilization as a change agent for higher education in Nigeria.

Charles P. Akpan (2014) found out the influence of ICT competence on lecturers' job efficacy in two Nigerian universities. The sample of the study consisted of 500 university teachers randomly sampled from a population of 1,795. Data for the study were collected using ICT Competence and Job Efficacy Questionnaire (ICTCJEQ). The data were analyzed using Chi-square and One-way Analysis of variance (ANOVA) statistical techniques. The results of the study revealed that male and female lecturers did not differ significantly in their level of ICT competence. Lecturers with high ICT competence were found to be more efficacious in classroom instruction, research/publication, communication and record keeping than those with moderate and low levels of ICT competence. This study revealed that the level of ICT competence of lecturers significantly enhanced their job efficacy. It directed the University management, to provide ICT facilities in lecturer's office to enhance their job efficacy and encourage lecturers to participate in ICT training programmes.

Douglas Kunda (2014) conducted a research in the Mulungushi University of Zambia, Africa, to assess the variables which could assist faculty members to change their attitude towards the use of ICT for teaching and research. Survey approach was used for this study, through administration of self-administered questionnaires. The data collected from 452 teaching faculty were coded and analysed in Libre Office Calc. Frequency distributions were

used as a standard to compare the relative importance of the variables. Lack of basic knowledge/skills of ICT as well as knowledge/skills for ICT integration in teaching and research and lack of positive attitude among the faculty members were identified. The researcher recommended some activities viz., direct sensitization of faculty members on advantages of ICTs in research, teaching and learning and the use of incentives to motivate faculty members, which could be applied by the African Universities.

The survey of **Fakhra Aziz et al., (2014)** aimed to diagnose the impact of training on teachers competencies. The three categories of competencies: pedagogical, assessment & management and research of teachers having no training and trained teachers were compared. Teachers Competencies Measurement Scale (TCMS) was used to compare competencies of both cohorts and to estimate the impact of FPDP – an ICT training programme, on teacher competencies were made. The study revealed that in all the categories trained teachers were more competent than teachers having no training. The male teachers were found to have more competencies than the female teachers. The study suggested that training programme of this type should be continued to enhance the teachers' competencies.

The purpose of the study of **Irina Malinina (2015**) was to identify key factors having a significant impact on teachers' ICT skills. The main tools used in this research were questionnaire, interview and observation. The questionnaire consisted of 30 questions grouped into 3 fields: demographic data, teachers' ICT knowledge and skills and application of ICT in the classroom. Besides closed questions, there were some open ones which helped to gain more information about teachers' attitude towards using ICT, their fears about its possible negative effect and challenges they have to face while introducing ICT at their lessons. As many as 116 responses were received from Department of Czech Language and Literature, Palacky University Olomouc, Czech Republic. The research showed the majority of foreign languages teachers had necessary knowledge, above basic or intermediate skills of ICT

applications. A vast number of teachers viewed the teacher development courses on ICT as valuable and the teachers were quite optimistic about ICT.

Sattam Allahawiah et al, (2015) took 232 teachers of Southern Colleges of Balqa Applied University as sample and studied the factors affecting their use of ICTs. The results of this study indicated that, teachers had a high level of knowledge and skills and a majority of respondents use ICT in teaching activities confirming the availability of computer and internet to majority of respondents. The regression analysis (average t = 3.63), showed that the skills in using ICT explained the extent to which faculty members used ICT. It also confirmed the improvement in the usage of these technologies due to the conduct of in-service courses aiming at increasing teacher's familiarity and knowledge about ICT.

Victor. N. Nwachukwu et al., (2015) have studied the computer literacy skills possessed by academic staff members of University of Jos (UNIJOS). An evaluative questionnaire was designed and data were collected from 97 academic staff from a population of 974 of UNIJOS. The findings from percentages, mean and frequency tables revealed that the lecturers had an average level of computer literacy and hands-on skills. They were found to use it only for typing/printing of lecture notes, computing of students' results, surfing the internet for information and sending e-mails. Inadequate funds, inadequate power supply and too much work load for academic staff were discovered to be the mitigating factors in their quest to utilize computer in their academic work and possible remedies were suggested.

Gisela C. Jasmin-Siapno (2016) investigated the faculty members' competence and integration of ICT in instruction. It determined whether the faculty members' levels of ICT competence and integration were significantly related to their profile variables of sex, age, and highest educational attainment, teaching experience and teaching discipline. Likewise, this study sought to find out the correlation between the faculty members' level of ICT competence and

their level of integration in using ICT as teaching tools. The descriptive research design was employed to collect information concerning ICT integration and competence of the faculty members. The data collected were analyzed and served as bases in devising a plan of action to enhance the faculty members' competence and integration of ICT in instruction. ICT competence is positively correlated to the integration of ICT tools in teaching. Sex, educational qualification and teaching discipline of the faculty members are not associated with their levels of ICT competence and integration. The faculty members' age and number of years of teaching experience are predictors of their levels of ICT competence and integration of ICT tools in instruction. Age and years of teaching experience are inversely related to the teachers' ICT competence and integration level.

Justin J. O. Ezeugwu (2016) conducted a study to assess the three levels of competencies (personal, pedagogical and subject oriented) of Mathematics lecturers in the application of ICT in Mathematics instruction in tertiary institutions in Cross River State, Nigeria. In this descriptive survey, six research questions and three null hypotheses were involved. The questionnaire was administered to 26 Mathematics lecturers and their responses were analyzed. The results indicated that most of the Mathematics lecturers had moderate level of ICT competencies and Institutional types did not have any significant influence on the extent Mathematics lecturers apply ICT competencies in their teaching process. It identified that, personal ICT competence in Mathematics instructions was applied in a high extent while pedagogical and subject oriented competencies were applied in low extent. Recommendations were made to the institutional administrators to help the lecturers further for facilitating the application of ICT in mathematics instruction at all levels.

Laura Pons Segui et al., (2016) attempted to evaluate the ICT competencies of professors of Spanish universities. They tried to check whether the professors believed the key role of ICT in their professional

esteem, by evaluating their ICT standard and correlating with their professional achievements. As many as 105 professors from seven Spanish universities responded the questionnaires issued. The results highlighted the ICT competencies and the positive perceptions that university teachers had for their academic esteem. The importance of the department interest towards the development of ICT competencies of the professors was notified. A range of professors believed ICT enhanced their competencies and promoted their professional esteem whereas just a few professors did not have clear confidence on this influence.

Onwuagboke et al., (2016) have selected 243 academic staff from five tertiary institutions in Imo State, Nigeria, using a stratified random sampling, for their study on ICT Attitude and Use Responses for the ICT Attitude Questionnaire -ICTAQ and the ICT Use Questionnaire-ICTUQ were collected. Results showed that both male and female academic staff equally exhibited a positive attitude to the use of ICT in teaching and learning, thereby gender was found to have no significant effect on ICT attitude of faculty members. Similarly the type of institution was discovered to have no influence on the attitudes of faculty members towards ICT.

2.4. Review of Research Studies conducted in India

Manoj Kumar Sinha (2008) conducted a research survey during the Refresher Course on "Information Technology" at Academic Staff College, Himachal Pradesh University, Shimla where, about 50 college and university teachers have participated for their upgradation of knowledge and career advancement among the author was one of the participants. A self-designed questionnaire comprising of 34 questions, was prepared and distributed to 49 participants and out of which 41 (83.67%) have responded. Internet literacy was very much poor among the respondents. Out of 41 participants, only 36.59 % were internet literates whereas maximum respondents (63.41%) were internet illiterates. Among the internet literates, 40% of them were experts, 53. 33% were intermediate and 6.66% were novice in using internet. The survey

results indicated that 46.31 % have taken formal IT Training, whereas 53.65% have not taken any formal IT training.

Rajeswari (2008) conducted a study on "Awareness and Application of ICT in Higher Education at Kodaikanal". This study attempted to access the awareness of ICT in Higher Education. The sample of the study included six higher education institutions: 66 women teachers and 24 men teachers working in these institutions constituted the sample. Two questionnaires viz., Awareness of ICT and Application of ICT were constructed. From the data collected, it was identified that majority of the teachers were found to possess below average or low level of ICT awareness and it was further recommended that all the teachers in higher education should be given rigorous and compulsory ICT training as application of ICT was not very satisfactory in Higher Education Institutions at Kodaikanal. It was suggested that all the institutions could share their resources in conducting periodical workshops and training in ICT for teachers to enrich the applications of ICT in teaching and learning process.

Zayapragassarazan et al., (2010) studied the computer competencies of higher education teachers working in the Arts and Science colleges of Puducherry region. The research was aimed at identifying the extent and frequency of the faculty members' use of computer applications for teaching learning processes and their main concerns regarding using technology in teaching. Questionnaires, designed to provide an overview of the above said research parameters were administered to 120 Arts and Science teachers of Puducherry region, India. The results showed that, faculty members were moderately competent in using internet, e-mail, word processing, presentation software and transparencies and less competent in various other areas of technological tools. Their frequency of use in the moderately competent areas was higher when compared to other tools. Therefore, a larger dose of training was recommended on the use of other technological tools. It was concluded that with limited knowledge and resources those teachers were able to incorporate technology in their teaching-learning process and if they were

provided with adequate training on the advanced technological tools to raise their level of competencies, no doubt they would bring innovations in their classrooms.

Thanuskodi (2011) in his study on ICT awareness employed a well-structured questionnaire for data collection from the faculty members and students (under graduate and post graduate students along with research scholars) of Government Arts and Science colleges in Tirunelveli region, Tamil Nadu. Out of the 600 questionnaires distributed, 480 valid responses (80% response rate) were collected. The results showed that faculty respondents bagged the first position in computer awareness, skill and in their overall frequency of using internet when compared with the research scholars, post graduate and under graduate students. The research scholars stood first in their e-resources usage, but the teaching faculty remained in the last position, preceded by the undergraduate and post graduate students.

Shabnam Mahat et al., (2012) had a survey analysis among 30 teachers possessing Master degree in Computer Applications and taking the ICT classes for BCS course in the faculty of Computer Science of Sangli. The Attitude Scale for ICT Teaching (ATICT), Attitude Scale for Student Engagement in the Class (ATSE) and Attitude Scale for ICT Teaching Time (ATITT) were developed by the researcher for data collection. The results indicated significantly high and positive correlations between ATICT and ATITT. It was also found that there was a significantly high, and positive correlation between ATSE and ATITT. On the other hand, no correlation was found between ATICT and ATSE. The results indicated that there was a high and negative correlation between ATICT and ATITT, which explained that usage of ICT reduced the time required for teaching. Highly positive correlation between ATICT and ATSE showed that, ICT would increase the student engagement in the class.

The main objective of the study of **Nadira Banu Kamal (2013)** was to find out: the extent to which the students and teachers are favorably or

otherwise disposed towards ICT; the difference, if any between Arts, Science and Engineering teachers as well as students in respect of their attitude towards ICT; the support extended by management of the institution to facilitate ICT in their institutions. By using cluster sampling technique, 400 students and 100 teachers from the five Muslim colleges in Ramanathapuram district of Tamil Nadu were selected. Among the teachers, 60 were male and 40 were female; 60 were from Arts and Science colleges whereas the remaining were from Engineering colleges. It was reported that as many as 78% of the teachers had a favorable attitude towards ICT and only 22% of them had an unfavorable attitude towards it. The engineering college teachers and teachers of science stream were ahead in their ICT activities and attitude, while compared with teachers of arts stream. Similarly students of engineering and science stream were leading the students of arts stream in their ICT activities.

Reena M. Tak (2013) examined the relationship between ICT integration into teaching and faculty members' perceptions of ICT use to improve teaching. The sample included 50 faculties of different departments like, Computer Science and Engineering, Information Technology, Master of Computer Applications, Applied Sciences and Humanities from a college at Khargone district, Madhya Pradesh. The questionnaire was designed in two parts whose first part was to evaluate the frequency of usage of various ICT tools as taken by faculties in their teaching and second part was to check the perception of the faculties about the usage of ICT. The findings revealed that content specific tools and applications were used by the teachers with more experience in teaching, who had positive perception on ICT. As teachers with more experience were with more control of the logistics of teaching and have become more comfortable with the content, they were more likely to introduce such innovative teaching practices as technology integration into their teaching. At the same time, it revealed the dire need of training programme for teachers with less experience.

Vandana Mehra et al., (2013) developed a scale for measuring the university teachers' attitude towards ICT. The Attitude towards ICT Scale with 71 items, on seven domains as ICT use in instructional setting, Confidence in ICT use, Encouragement from colleagues, ICT socialization, ICT relative advantage, ICT complexity and Barriers to ICT use was developed and validated for data collection. The scale was administered to 100 teachers from Punjab University, Chandigarh. The findings revealed that teachers with high ICT confidence level were accustomed to ICT socialization and were aware of relative advantages of ICT and had a least concentration and confusion on the ICT complexity.

Senthur Velmurugan et al., (2014) explained the availability level of ICT resources and their use by the faculty members in the Arts and Science Colleges of Virudhunagar District, Tamilnadu, India. The study focused on the awareness adequacy, purpose, usefulness and satisfaction level of using ICT based resources among the users of the selected colleges. The data were collected through a questionnaire to study the information need for the faculty members. The study revealed the adequacy of ICT availability in the selected colleges in fulfilling their information needs. From this study it was found that a majority of the respondents (49.08%) had excellent awareness and current knowledge of the ICT based resources and lower percentage of teachers were found to have lower level of ICT knowledge. The necessity for further training the faculty members for updating their ICT knowledge was insisted.

Ziba Nikkhah Far et al., (2014) examined the university teachers' computer competence and explored its effects on university teachers' attitude towards ICT. The population of the research was 746 full time university teachers working in ten departments of Punjab University, Punjab from which 200 teachers were selected by stratified random sampling. "University Teachers' Attitude towards Information and Communication Technology Scale", "Computer Competence Scale" and "demographic characteristics" tools constructed by the researchers were used. Among them the five point scale tool

“Attitude towards ICT Scale” with 71 Statements was used to check the attitude of the teacher in seven domains as “ICT use in instructional setting, Confidence in ICT use, Encouragement from colleagues, ICT socialization, ICT relative advantage, ICT complexity and Barriers to ICT use. About 94% of the university teachers had positive attitude towards ICT. However, only 6% of sample teachers had negative attitude. University teachers of Arts and Science faculty with higher computer competence exhibited better attitude towards ICT integration into teaching.

Chaman Verma et al., (2015) carried out a research work to investigate the significant difference in the ICT knowledge levels existing among the students and faculty members. More than 900 participants (students, research scholars and teaching staff) from six universities located in Punjab and Haryana states were included in this study. Findings of the study proved that there was no significant difference between students and faculty members in their ICT knowledge. Significant difference was observed between male faculty members and boy students with reference to their ICT knowledge and male faculty were more conscious about ICT as compared with the boy students. Similarly, significant difference was identified between female faculty and girls students in their ICT knowledge and female faculty scored more than the girl students in their of ICT knowledge. Male teachers were found to be better while compared with the female teachers in their ICT knowledge level. Both faculties and students including research scholars were channeled towards training programmes for further improvement.

Chandra Purkayastha (2015) collected the data from 160 students and 40 teachers of different affiliated colleges of Mumbai through questionnaire and telephonic interview methods, to find out the ICTs’ penetration level achieved in various subjects viz., Languages, Economics, Commerce, E.V.S., Advertisement, Mathematics and Accountancy, Sciences and Humanities. From the collected data, the real level of percentage of ICT usage in education and the possible level of the same in different subjects were compared. Almost

teachers of all subjects were identified below average in their ICT usage owing to their low ICT competencies. About 30% of the teachers openly accepted their incapability to develop digital contents, due to their poor ICT skills. Among all, the science teachers exerted comparatively better ICT effort than their counterparts in other subjects.

Sachin Kumar (2015) attempted to find the status of ICT exposure, current usage level of ICT in teaching and research and about the perceived barriers in the effective use of ICT, among the participants of an interdisciplinary refresher course on information technology at Academic Staff College, Himachal Pradesh University, Shimla. A brief questionnaire was administered to a sample of 37 teachers, teaching in different colleges as well as universities in India. In general, moderate computer confidence was identified among the teachers of subjects other than computer science and information technology. Majority of the respondents used ICT in both teaching and research, owing to their high level of ICT knowledge. Those who used ICT in teaching, used it for collecting material the most and for delivering lectures the least. Lack of time and peer supports were considered as least important barriers, while lack of infrastructure and training were rated most important ones.

Ashok et al., (2016) assessed the exposure of Information and Communication Technology and the access of e-resources by the faculty members of Arts and Science Colleges affiliated to University of Madras, Tamil Nadu. In order to collect the comprehensive and relevant data from the faculty members of three Autonomous Arts and Science colleges affiliated to University of Madras, a structured questionnaire was designed and interview method was also adopted. As many as 150 questionnaires were distributed to the respondents, out of which 106 filled questionnaires were received (70.67% return rate). The study concluded that most of the faculties were females in the designation of Assistant Professor and majority of them had positive attitude on ICT and one third of the respondents (34.91%) had no knowledge of search

skills. The work identified the need for immediate conduct of ICT training programmes.

The research of **Chaman Verma et al., (2016)** focused on the ICT awareness among students and faculty of Indian Universities. It investigated the attitude of students and faculty towards ICT awareness in relation to their gender. Among the 904 participants from various universities located in Punjab and Haryana states of India, 344 were teachers, (among them 175 were male and 169 were female) and the remaining were students including research scholars. It has been concluded that gender variable did not affect students and faculty opinions towards information and communication awareness. The findings proved the absence of meaningful difference between male and female faculty towards ICT awareness. The findings provided suggestions to both the states' administrators and universities' authorities to provide more ICT resource facility in academic institutions to promote technology based quality education.

Manju et al., (2016) conducted an online survey using Survey Monkey portal to find out the university teachers' use of ICT, their awareness and confidence in using the different variety of the internet. The investigators developed a questionnaire comprising of 22 items with six factors. The data were collected from 109 university teachers from various state and deemed universities at Coimbatore region, Tamil Nadu. The collected data were screened, grouped and subjected to descriptive analyses like frequency and percentage with the help of SPSS. It was concluded that 62.19% of the selected university faculty were utilizing internet applications regularly, they had good awareness and confidence, on internet applications for teaching learning purpose as well as for their research activities and the remaining faculty used internet applications randomly due to attitudinal barriers or for security reasons. Very few, due to their lack of computer related knowledge, never utilized internet facilities.

2.5. Insights drawn from the Reviews

Based on the analysis of the previous studies conducted on the three variables, viz., ICT Knowledge, ICT Skills and Attitude towards the inclusion of ICT into Teaching- Learning process, it was found that Information and Communication Technology Competencies is emerging as one of the vital areas of research in the field of education. The investigator has reviewed as many as 65 studies related to the variables under study. The reviewed studies covered different universities and the samples ranged from the faculty members of universities as well as colleges, training institutions etc.

Stratified Random Sampling, Multi-Stage Sampling, Simple Random Sampling and Purposive Sampling are the major sampling techniques used in the studies under review. Questionnaires both direct as well as mailed, online questionnaires, interviews and observation were used as instruments for data collection. Majority of the studies used percentage analysis, Mean, Standard Deviation and t-test as the statistical techniques. Some of the studies adopted other statistical techniques namely, Correlation, Regression, Chi-Square test, ANOVA and ANCOVA.

The review of studies conducted in India and abroad in the area of ICT Competencies and the use of technologies in teaching – learning process have helped the investigator to a greater extent in revising some of the procedures involved in the study. A look back into the researches done in the area of research concerned brought out the gap and overlaps and helped the investigator in identifying the research gap. Hence, the investigator took a planned effort to fill this research gap. On the whole, the review was of immense use to the investigator in understanding the problem under study from different perspectives.

2.6. Rationale of the Study

In all, the investigator has presented 65 reviews of related studies, though the investigator went through a number of research reports, policy

documents etc., related to the key variables of the study. Out of the reviews presented in this chapter 49 are studies conducted abroad; 16 are reviews of studies conducted in India. The low number of researches conducted in India on Information and Communication Technology Knowledge, Skills and Attitude reveals that there is a research gap.

Further, it is pertinent to note that comprehensive researches on Information and Communication Technology Knowledge, Skills and Attitude of Higher education teachers in India after the implementation of National Mission on Education through Information and Communication Technology (NME-ICT) are only very few. In this context studies like the present one focusing on the three important dimensions of ICT integration viz., Knowledge, Skills and Attitude are not only desirable but the need of the hour. Thus the present study attempts to fill the research gap as revealed by the reviews.

2.7. Conclusion

This chapter has presented the review of studies related to the problem under study. The review has enabled the investigator to plan his course of research, to formulate suitable hypotheses, to develop suitable tools in systematic and scientific ways, to select sample and to decide on the statistical technique for analysis of data. These aspects of the modus operandi of the study are presented in the next chapter.

Chapter – III

Methodology of the Study

CHAPTER - III

METHODOLOGY OF THE STUDY

"The methods and procedures are really the heart of the research activities, should be described as much in detail as possible and the continuity between them should be apparent".

- Wiersma and Jurs (2005)

3.1. Introduction

"Research is a systematic activity that is directed towards discovery and the development of organized body of knowledge" (Best and Khan, 1995). Research involves formulating the problem to be investigated, selecting a suitable research design, choosing and applying appropriate procedures for data collection, analysing and communicating the process and findings through a written report.

Educational research helps to solve problems related to teaching and learning in a systematic and scientific manner and it is used to understand, explain, predict and control human behaviour in the context of education. Descriptive research one among the types of educational research, helps to measure items, discovers causes and reports what has happened or what is happening at the present situation. Though descriptive research is of different types, the investigator chose survey research, to obtain information from the responses of the teachers of Arts and Science Colleges of Bharathidasan University region with a view to describing their current scenario of the ICT Knowledge, Skills and Attitude (ICT-KSA).

3.2. Methodology

Methodology is the procedure adopted in a research study. It occupies a very prominent position in any kind of research process. Selection of a

particular research procedure depends on the objectives of research and the suitability of the particular research procedure.

According to Ebel (1980), "Appropriate tasks for survey research are to identify common problems, to learn about circumstances associated with these problems and to discover what seems generally effective in solving these problems". It is necessary for the researcher to know, not only the research methods or techniques but also the methodology. The success of any research depends on its methodology. According to Heinman (1995), methodology contains the information needed to understand critique and literally replicate the data collection procedures. Research methodology involves the systematic procedure by which the researchers start from the initial identification of the problem to its conclusion and thus outlines the entire research design.

According to Babbie (2010), "Quantitative methods emphasize objective measurements and the statistical, mathematical or numerical analysis of data collected through polls, questionnaires and surveys or by manipulating pre-existing statistical data using computational techniques. Quantitative research focuses on gathering numerical data and generalizing it across groups of people or to explain a particular phenomenon". This chapter presents a brief description of the method adopted, population and sample for the study, tools and techniques adopted for collection of data, procedure for data collection, scoring and processing of data and statistical techniques used for the study.

3.3. Research Design

According to Claire Selltiz (1962), "A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure".

The research design is the conceptual structure within which research is conducted. It constitutes the blueprint for the collection, measurement and

analysis of data. Research design is needed because it facilitates the smooth sailing of various research operations, thereby making research as efficient as possible in terms of the applied quantum of effort, time and money.

The purposes of research design are as follows:

- A research design helps the investigator to obtain answers to research problem and issues involved in the research, since it is the outline of entire research process.
- It tells us how to collect data, what observations are to be carried out, how to make them and how to analyse the data.
- It guides the investigator about the statistical techniques to be used for analysis.
- It also guides the control of certain variables in experimental research.

Research design stands for advance planning of the methods to be adopted for collecting the relevant data and the techniques to be used in their analysis, keeping in view the objective of the research and the availability of staff, time and money. Preparation of the research design should be done with great bearing on the reliability of the results arrived at and as such constitutes the firm foundation of the entire edifice of the research work. The research design of the present study is given in the Flow Chart (Figure 3.1)

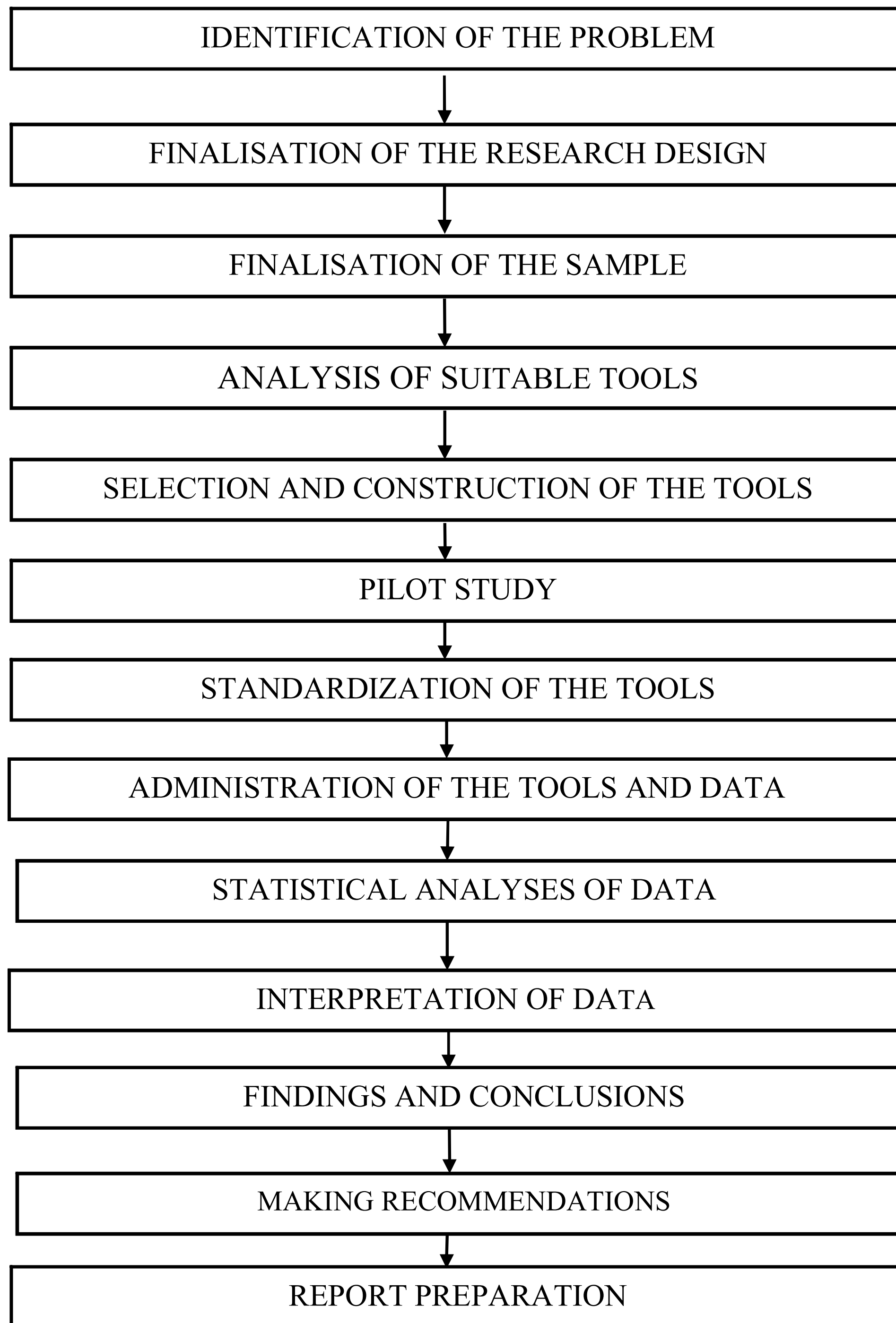


Figure 3.1 Flow Chart showing the Different Stages of the Study

3.4. Population of the Study

The present study analyses the Information and Communication Technology Knowledge, Skills and Attitude (ICT-KSA) of the teachers of the Arts and Science Colleges of Bharathidasan University region. Hence, the targeted population considered for the present study was the teachers working in the Government, Government aided and Self-financing Arts and Science Colleges of Bharathidasan University region. Since collecting data from such a vast population is impracticable, the data were to be collected from a sample and the investigator chose a representative and manageable sample as detailed below:

3.5 Sample for the Study

In the sampling procedure, the colleges affiliated to Bharathidasan University were considered as the sampling unit and all the Government, Government aided and Self-financing Arts and Science Colleges in Bharathidasan University region were considered as the sampling frame. The investigator collected the list of Arts and Science colleges affiliated to the Bharathidasan University from the Bharathidasan University website. The name list of the colleges is given in Appendix – I.

For the present study, the investigator divided the population in strata on the basis of the revenue districts (eight in number viz. Tiruchirappalli, Pudukkottai, Tanjore, Perambalur, Nagapattinam, Karur, Ariyalur and Tiruvarur districts), covered by the geographical jurisdiction of Bharathidasan University. From these districts, 43 colleges were drawn at random. The research tools were distributed to 823 teachers selected randomly from the above mentioned colleges. The investigator could get back only 667 complete and valid responses with 81% return rate. Thus, as many as 667 teachers formed the final sample for the present study as detailed in Table 3.1.

Table 3.1

Description of the Sample

S.No.	Name of the Institution	Male	Female	Total
1	Sri Venkateshwara College of Arts and Science, Peravurani	-	14	14
2	Kurinji College of Arts and Science, Tiruchirappalli	12	3	15
3	Srimad Andavan Arts and Science College, Tiruchirappalli	7	13	20
4	Cauvery College for Women, Tiruchirappalli	-	16	16
5	Bon Secours College for Women, Thanjavur	-	13	13
6	Sri Saradha College for Women, Perambalur	-	12	12
7	Sir. Issac Newton College of Arts and Science, Nagapattinam	11	5	16
8	Shrimathi Indira Gandhi College, Tiruchirappalli	-	15	15
9	Jairams Arts and Science College, Karur	10	8	18
10	Sudharsan College of Arts and Science, Pudukkottai	6	8	14
11	M.I.E.T Arts and Science College, Tiruchirappalli	11	4	15
12	Thanthai Hans Roever College, Perambalur	8	7	15
13	Rajagiri Dawood Batcha College of Arts and Science, Papanasam	2	14	16
14	Idhaya College for Women, Kumbakonam	-	16	16
15	Chidambaram Pillai College for Women, Mannachanallur	2	14	16
16	Aiman College of Arts and Science for Women, Trichy	-	14	14
17	Dhanalakshmi Srinivasan College of Arts and Science for Women, Perambalur	-	20	20
18	Kongu College of Arts and Science, Karur	7	13	20
19	Aadhavan College of Arts and Science, Alathur, Manappaarai	7	10	17
20	Government Arts College, Kumbakonam	17	-	17
21	Kunthavai Naachiyar Government Arts College for Women, Thanjavur	-	16	16
22	Government Arts College, Ariyalur	13	5	18

23	Periyar EVR College, Tiruchirappalli	10	10	20
24	Government Arts College, Tiruchirappalli	8	6	14
25	H.H. The Rajah's Government College, Pudukkottai	10	7	17
26	Government Arts College for Women, Kumbakonam	-	15	15
27	Government Arts College for Women, Pudukkottai	-	15	15
28	Government Arts College, Karur	17	4	21
29	Thiru Vi. Ka. Government Arts College, Thiruvarur	7	5	12
30	National College, Tiruchirappalli	18	4	22
31	Jamal Mohamed College, Tiruchirappalli	23	-	23
32	Nehru Memorial College, Puthanampatti	8	7	15
33	Seethalakshmi Ramaswami College, Tiruchirappalli	-	17	17
34	AVVM Sri Pushpam College, Poondi	8	-	8
35	Urumu Dhanalakshmi College, Tiruchirappalli	9	6	15
36	Bishop Heber College, Tiruchirappalli	5	7	12
37	Kadir Mohideen College, Adirampattinam	13	3	16
38	St. Joseph's College, Tiruchirappalli	12	1	13
39	Holy Cross College, Tiruchirappalli	-	16	16
40	Bharathidasan University Constituent College, Lalgudi	5	4	9
41	Bharathidasan University Constituent College, Perambalur	11	4	15
42	BDU Constituent Model College for Women, Veppur	-	8	8
43	Bharathidasan University Arts and Science College, Navalur Kuttappattu, Srirangam	6	5	11
Total		283	384	667

3.6. Instrumentation

In order to assess the Information and Communication Technology Knowledge, Skills and Attitude (ICT-KSA) of the teachers of Bharathidasan University region, the following tools, developed and validated by the investigator were used.

- ICT Knowledge Questionnaire (ICT-KQUEST)
- ICT Skills Assessment Scale (ICT-SAS)

Besides these, Attitude towards the Use of Information and Communication Technology (ICT) in Teaching Scale (ATUITS), developed by Rajasekar (2014) was also used for collecting data. In addition, a General Information Questionnaire was also used for collecting base line data.

3.7. Pilot Study

In this process, the double filter approach was followed in order to filter the irrelevant and unwanted items in the research questionnaire. The double filter approach has two stages of analysis as follows:

i. Judgmental Analysis or Rational Analysis
ii. Empirical or Statistical Analysis

i). Judgmental Analysis or Rational Analysis

This is the first filter of the approach, in which the investigator obtained experts' opinion. With the help of experts' opinion, the rational analysis was done as to check whether its content was accurate, congruent with the test specification, free from cultural bias and not contrary to the standard item-writing guidelines. The total number of items pooled, the total number of items discarded and total number of items finalized through Judgmental or Rational analysis are given in the Table 3.2.

Table 3.2

Judgmental Analysis of the Items

Dimensions	Number of Items Pooled	Number of Items Discarded	Number of Finalized Items
ICT Knowledge	70	26	44
ICT Skills	146	22	124

ii). Empirical or Statistical Analysis

The second filter of the approach is statistical analysis in which the items are checked by statistical measures and this type of analysis is called as 'Item Analysis'. According to Garett (1979), "The major aim of item analysis is to obtain objective information concerning the items pooled, which is

valuable to eliminate subjective judgment in selecting the items". After rewording, modifying and eliminating the items in judgmental process, the items were put under item analysis procedure. The ICT Knowledge Questionnaire with 44 items and ICT Skills Questionnaire with 124 items were administered to a set of 40 teachers of an Arts and Science College of Bharathidasan University region for the purpose of piloting. The data collected were subjected to the second stage of filtering i.e. statistical analysis. The details of the procedures followed for each of the developed and validated tools are given below.

3.8. Development and Validation of ICT Knowledge Questionnaire (ICT-KQUEST)

The ICT Knowledge Questionnaire (ICT-KQUEST) is an objective type questionnaire which consists of Multiple Choice Questions (MCQs). The Multiple Choice Questions were used, as they are considered the most versatile method among all objective type test items (Aiken, 1994). There are six stages in the development of the ICT Knowledge Questionnaire. In the first stage, some ICT Knowledge Questionnaires were examined, to have a skeleton sketch of the proposed ICT Knowledge Questionnaire. In the second stage, the investigator prepared a rough draft with an item pool of 70 MCQs. In the third stage, the initial scrutiny of the MCQs was done by the investigator with the help of the research supervisor and from the pool of items, 59 items were chosen. In the fourth stage, for the purpose of content validation, the initial draft of the ICT Knowledge Questionnaire with 59 MCQs was given to some experts in the field of Educational Technology and some Computer Science teachers for obtaining their opinion, whether the selected items were valid for assessing the ICT Knowledge of teachers of the Arts and Science Colleges of Bharathidasan University region.

The experts and teachers examined the items with regard to the relevance, content coverage, understandability and consistency among one another. On the basis of the feedback from the experts and teachers, 15 items

were deleted, and a few items were revised and reworded. Thus, the ICT Knowledge Questionnaire consisting 44 MCQs was finalized. In the fifth stage, i.e. the Piloting Stage, the pre-final draft of the ICT Knowledge Questionnaire with 44 items was administered to 40 teachers of an Arts and Science College of Bharathidasan University. The responses of the teachers were analyzed. A score of 1 was given for the right response whereas a score of 0 was given to the wrong response, and the total score of each teacher was calculated. Then, the scores were arranged in the descending order. The top 27% of the response sheets (11) were kept in one group, known as high extreme group. The bottom 27% of the response sheets (11) were kept as the other group, known as low extreme group. From the individual score of each item of the questionnaire, Item difficulty and Discrimination level were calculated to finalize, whether the item was to be included in the final tool or to be excluded.

3.8.1 Item Difficulty and Discrimination Index

"The difficulty of an item may be defined as the proportion of the examinees that marked the item correctly. The numerical term which indicates the level of difficulty is called the difficulty index". (Y.P. Agarwal, 1998)

"The difficulty index of each item is found by averaging the percentage, correct in both the upper and lower groups. The percentage is approximate but is accurate enough for most purposes and has the advantage of easy computation". (Garrett, 1979)

The investigator computed the item difficulty with the formula given by Cohen et. al., 2011 as

$$\text{Item difficulty} = (A/N) \times 100$$

Where , A = the number of teachers who answered the item correctly and

N = the total number of teachers.

The item discrimination or the discriminating power of a test item refers to, "the potential of the item in question to be answered correctly by those

teachers who have a lot of the particular quality that the item is designed to measure or to be answered incorrectly by those teachers who have less of the particular quality that the same item is designed to measure". (Cohen et.al., 2011)

The formula used to obtain the Discriminating Index is

Discrimination Index = A – B/1/2(N)

Where, A = the number of correct scores from the high scoring group

B= the number of correct scores from the low scoring group

N= the total number of teachers

The Item difficulty and the Discrimination index for all the 44 items of the final ICT Knowledge questionnaire administered for the purpose of Pilot Study are given in Appendix-II.

As the sixth step, the items were selected for the final tool based on item analysis scores. According to Rammers et al., (1967), "Any item whose difficulty index is lower than 10% or higher than 90% should be considered as worthless for measurement". Similarly, according to Ebel (1966), "Any item whose Discrimination Index is above 0.30 should be considered as reasonably good item".

In the present study, only such items fulfilling the above two criteria were included (i.e.) 7 items were deleted and only 37 items were retained in the final draft of the ICT Knowledge Questionnaire. Table 3.3 shows the total number of items pooled, total number of items discarded and total number of items finalized through Empirical or Statistical analysis.

Table 3.3

Empirical or Statistical Analysis of the Items

Dimension	Number of Items Pooled	Number of Items Discarded	Number of Finalized Items
ICT Knowledge	44	7	37

The reliability of the ICT Knowledge Questionnaire was calculated with the Kuder-Richardson 20 formula by following the undermentioned steps.

- Enter the scores for each item, as 0 and 1 for the wrong and right responses respectively.
- Calculate the total number of teachers who answered the item correctly.
- Divide the number of teachers who answered the item correctly by the total number of teachers and then their proportion (p).
- Calculate the proportion who failed to answer correctly (q)
- Calculate Standard Deviation and Variance (σ^2)
- Reliability is calculated using

$$R_{kr20} = (k/k\text{-}1)\ (1\text{-}\sum pq/\sigma^2)$$

Where 'k' is the total number of items.

The calculated reliability of the ICT Knowledge tool was as 0.88088 and thus the tool was found to be valid.

3.8.2 Scoring Procedure

The scoring procedure for the ICT Knowledge Questionnaire is as follows:

The MCQs are to be answered by choosing any one of the 4 options. A key with correct options for the 37 MCQs is prepared. A score of 1 is given for the right option and a score of 0 is given for wrong option. The maximum obtainable score for the ICT Knowledge questionnaire is 37. The higher the teacher scores, the higher is his/her ICT Knowledge.

3.9. Development and Validation of ICT Skills Assessment Scale (ICT-SAS)

The ICT Skills Assessment Scale (ICT-SAS) is a five point Likert type rating scale, consisting of 114 items, under 13 sub-sections viz., Computer Management, Computing Hardware and Environment, Word Processing, Spreadsheets, Presentation, Using the Interactive Whiteboard, Using the Internet, E-mail, Multimedia, Using Web 2.0 Tools, Lesson Planning, Teaching

& Delivery and Assessing & Evaluating. The development and validation of the ICT-SAS was done through a six step process as detailed below:

At the first step, the investigator consulted the conceptual and research literature on ICT Skill and its assessment procedure in order to understand its various dimensions and to decide what was to be assessed. At this stage, a number of tools used in the earlier studies were also analyzed. As the second step, by taking the ICT Skill Audit Questionnaire of Eddie Naylor (2002) as a model, the investigator prepared a rough draft with an item pool of 146 statements under different sub-sections. As the third step, the initial scrutiny was made on the tool by the investigator with the help of the research advisor and 14 statements were dropped and some were reworded and modified. As the fourth step, the draft tool with 132 items, was given to the experts in the field of Information Technology (IT) of Arts and Science Colleges of Bharathidasan University region, for obtaining their opinions and suggestions, pertaining to the tool's relevance, consistency, content coverage etc. Based on their feedback, 8 items were dropped and 124 items were retained. Thus, the pre-final draft of ICT Skills Assessment Scale (ICT-SAS) with 124 items was arrived at. As the fifth step, the investigator piloted the pre-final draft of ICT-SAS with as many as 40 teachers working in the Arts and Science Colleges of Bharathidasan University region.

The responses were scored carefully and their scores were arranged in the descending order. The top 27% of the response sheets were kept in one group which was known as high extreme group. The bottom 27% of the response sheets were kept as the other group as low extreme group. Then, the investigator identified the significant difference between the mean scores of high and low groups by using 't' test for all the items in the questionnaire for assessing the teachers' ICT Skills. The significant level for 't' values was fixed at 5% level and the statements having the 't' value more than 2.68 (df=52) were retained for inclusion in the tool. Appendix-III shows the 't' values for all the 124 items in the pilot study ICT-SAS questionnaire. As many as 10

items were eliminated owing to their 't' value less than 2.68. Thus the final draft of ICT-SAS questionnaire with 114 items was arrived at. Table 3.4 shows the total number of items pooled, total number of items discarded and total number of items finalized through Empirical or Statistical analysis.

Table 3.4

Empirical or Statistical Analysis of the Items

Dimension	Number of Items Pooled	Number of Items Discarded	Number of Finalized Items
ICT Skills	124	10	114

The reliability of the tool was estimated by following the undermentioned steps

- Obtain the High 27% and Low 27% scorers list
- Mean of High score group is $\overline{X}$
- Mean of Low score group is $\overline{Y}$
- Reliability is given by

$$r_{XY} = \sum (X - \overline{X}) \sum (Y - \overline{Y}) / [\{\sum(X - \overline{X})^2\}\{ \sum(Y - \overline{Y})^2\}]^{1/2}$$

The reliability of the tool was estimated as 0.95 and thus reliability of the ICT-SAS was established.

3.9.1. Scoring Procedure

In the ICT-SAS, the respondents are asked to indicate their responses in numbers from 1 to 5. The meaning of these numbers and their corresponding scores (given within brackets) are as follows:

1- I am not aware of this application/function/operation (1)
2- I am aware of this function/operation but not experienced in using/implementing it (2)
3- I have used/done this occasionally but need practice/training to be confident (3)
4- I am a regular and confident user of this application/operation (4)
5- I am fully competent with this application/operation and could confidently explain it to others (5)

The maximum obtainable score is 570. The higher the teacher scores, the higher is his/her ICT Skill.

3.10. Description of ATUITS

Attitude Towards the Use of Information and Communication Technology (ICT) in Teaching Scale (ATUITS) is a Likert type one with 37 statements among which 17 are positive and 20 are of negative nature. Each statement has five alternative responses viz., Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA) and Strongly Disagree (SD). Table 3.5 represents the category of the items in the Attitude Scale.

Table 3.5

Category of the Items of ATUITS

Nature of the Items	Item Number
Positive Items	3, 4, 6, 7, 9, 13, 18, 21, 22, 24, 25, 26, 30, 32, 33, 35, 36
Negative Items	1, 2, 5, 8, 10, 11, 12, 14, 15, 16, 17, 19, 20, 23, 27, 28, 29, 31, 34, 37

3.10.1. Scoring Procedure

The scoring procedure for the Attitude Towards the Use of Information and Communication Technology (ICT) in Teaching Scale (ATUITS) is as follows: each statement in the Scale is to be answered by choosing one among the 5 options - Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. For the positive items, the scoring is 5, 4, 3, 2 and 1 for Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree respectively and for the negative items vice versa. The maximum obtainable score is 185. The higher the teacher scores, the higher is his/her ICT Attitude.

3.11. Description of General Information Questionnaire

The General Information Questionnaire consists of 25 items eliciting basic information from the respondents regarding their name, sex, age, designation, professional qualification, research qualification, category, type, nature and locality of the institution where they are working, possession of personal computer and internet connectivity at home, possession of internet access on mobile, length of experience with computer and internet, frequency of computer use, purpose of web use, availability of ICT devices, access to computer as well as internet connectivity at their institution for facilitating learning and their participation in training programmes for integrating ICT into teaching.

3.12. Data Collection

The investigator preferred 'Direct Approach' in administering the questionnaire instead of mailed approach, in order to facilitate the objective way of data collection. Further in the data collection in-person, the investigator had the opportunity to answer the questions and clarifications raised by the respondents. Further, the direct approach in administration of tool to group offered absolute satisfaction on the part of the investigation and it also enhanced the response rate to a high level. The tools developed for the purpose of collecting data for the present study were administered to 823 teachers working in 43 Arts and Science colleges of Bharathidasan University region.

While administering the research tool, the investigator explained the purpose of the present investigation and mode of responding the item in the research tool to the respondents. Further, the investigator assured the respondents that the data collected from them would be handled in a confidential way and the data would be used for the research purpose only. The investigator used a cordial approach which helped to collect objective and valid data from the teachers within the stipulated time. Out of 823 questionnaires issued, the investigator could get back 667 complete and valid responses which amounts to 81% return rate.

3.13. Data Analysis

The data were collected by the investigator by using the reliable and valid tools. After collecting the data, the investigator did the work of classifying, tabulating and recording the data in order to ensure perfect interpretation of data. The entire data were processed and analysed by making use of Statistical Package for Social Sciences - (SPSS-16). The data were subjected to appropriate descriptive, differential, correlational and regression analyses.

3.14. Conclusion

As detailed above the present research design has covered the following key research phases

- Identification of the Problem
- Selection of Sample
- Development and Validation of tools
- Collection of Data
- Analysis of Data
- Report Preparation

A detailed description of the analyses of the data along with appropriate interpretations is given in the following chapter.

Chapter – IV

Analyses and Interpretation of Data

CHAPTER – IV

ANALYSES AND INTERPRETATION OF DATA

"No human investigation can be called real science, if it cannot be demonstrated mathematically"

- Leonardo Da Vinci (1490)

4.1. Introduction

"When the data have been obtained, it is necessary to organize them for interpretation and presentation. Qualitative data may have to be summarized and Quantitative data may have to be treated statistically to make their significance clear". - Oliver Robert Alexandar Cavage (1946).

Analysis of data is the decisive footstep in research process. It is the relationship between raw data and significant results leading to conclusions. Analysis of the collected data is a vital component of any research work. Without analysis, which provides a deeper insight into its basic nature, the adequate description of a phenomenon is relatively impossible. Analysis of data means studying the organized material in order to discover inherent facts. The data are studied from as many angles as possible to explore the new facts, patterns and paradigms.

4.2 Data Analysis

The data analysis for the present research was done quantitatively. The data were obtained through the administration of the developed tools and analysed by using Descriptive (Percentage, Mean and SD), Inferential ('t' test and ANOVA), Relational (Correlation) statistics and regression analysis.

Table 4.1

Distribution of the Whole Sample in terms of Basal Variables

Variables	Sub-variables	N	Percentage
Designations	Lecturer	81	12.1
	Assistant Professor	452	67.8
	Associate Professor	134	20.1
Sex	Male	290	43.5
	Female	377	56.5
Age	24-34	261	39.1
	35-45	249	37.3
	46-56	157	23.5
Academic Qualifications	M.A.	215	32.2
	M.Sc.	311	46.6
	M.Com & M.B.A.	141	21.1
Professional Qualifications	None	399	59.8
	B.Ed.	194	29.1
	M.Ed.	46	6.9
	Any other	28	4.2
Research Qualifications	None	37	5.5
	M.Phil.	351	52.6
	Ph.D.	131	19.6
	Both	148	22.2
Category of the Institution	Government	208	31.2
	Government Aided	157	23.5
	Self- Financing	302	45.3
Type of the Institution	Men	25	3.7
	Women	237	35.5
	Co-educational	405	60.7
Nature of the Institution	Autonomous	268	40.2
	Non-Autonomous	399	59.8
Locality of the Institution	Urban	373	55.9
	Rural	294	44.1
Personal Computer at Home	Available	531	79.6
	Not Available	136	20.4

Internet Connectivity at Home	Available	451	67.6
	Not Available	216	32.4
Internet Access on Mobile	Yes	442	66.26
	No	225	33.73
Length of Experience with Computer	Less than 1 year	53	7.9
	1-2 years	90	13.5
	2-4 years	112	16.8
	4-6 years	74	11.1
	6 years and above	338	50.7
Frequency of Computer Use	Daily	350	52.5
	On alternate days	189	28.3
	Once in a fortnight or so	76	11.4
	Once in a month or so	42	6.3
	Never	10	1.5
Length of Experience with Internet	Less than 1 year	60	9.0
	1-2 years	116	17.4
	2-4 years	141	21.1
	4-6 years	84	12.6
	6 years and above	266	39.9
ICT Devices at Institution	Available	658	98.7
	Not Available	9	1.3
Computer Access at College	Yes	577	86.5
	No	90	13.5
Internet Connectivity at College	Available	505	75.7
	Not Available	162	24.3
Training Programmes	Participated	53	7.9
	Not Participated	614	92.1

From Table 4.1, it can be seen that, out of the total sample of 667, 12.1% are Lecturers, 67.8% are Assistant Professors and 20.1% are Associate Professors. Out of the total sample, 43.5% teachers are male whereas the remaining 56.5% are female. As many as 39.1% lie in the 24-34 years age group, 37.3% lie in the 35-45 years age group and the remaining 23.5% lie in 46-56 years age group.

With reference to Academic Qualifications, of the 667 teachers from 43 Arts and Science colleges 32.2% possess M.A. degree, 46.6% possess M.Sc. degree whereas 21.1% possess M.Com. and M.B.A. qualifications. With regard to Professional Qualifications, 29.1% of the teachers have B.Ed. degree, 6.9% have M.Ed. degree whereas 59.8% teachers possess neither B.Ed. nor M.Ed. degree. 4.2% have other professional degrees viz. PGDCA, M.C.A etc. Regarding Research qualifications, 52.6% teachers have M.Phil. degree, 19.6% teachers have Ph.D. degree, 22.2% have both M.Phil. and Ph.D. degrees whereas 5.5% of the teachers have neither M.Phil. nor Ph.D. degree.

Of the 667 teachers, 31.2% are working in Government colleges, 23.5% belong to Government aided colleges and 45.3% are in Self-financing colleges. 3.7% of teachers work in colleges meant only for men, 35.5% teachers work in colleges meant only for women whereas 60.7% teachers work in co-educational institutions. Regarding the nature of the institutions, 40.2% teachers work in autonomous colleges whereas the remaining 59.8% teachers serve in non-autonomous colleges.

As many as 55.9% teachers work in urban colleges whereas the remaining 44.3% teachers work in rural colleges. Of the 667 samples taken, 79.6% teachers possess personal computer at home whereas the remaining 20.4% do not possess personal computer at home. Regarding the internet connectivity at home, 67.6% teachers have the facility whereas the remaining 32.4% teachers do not have internet connectivity in their home. 66.26% of the teachers have internet access on mobile, whereas, the remaining (33.73%) do not have that access.

Of the sample of 667, the length of experience with computers is less than one year for 7.9% teachers, for 13.5% teachers, it is 1-2 years; 16.8% have 2-4 years of experience span, and 11.1% have touch with computers for 4-6 years whereas 50.7% of the teachers have regular use of computers for 6 years and more. Regarding the frequency of computer use, 52.5% use computers

daily, 28.3% use on alternate days, 11.4% use once in a fortnight or so, 6.3% use once in a month or so where as 1.5% of them never use computers.

With reference to the length of experience with the internet, 9.0% of the teachers have a minimum span of usage (less than one year), 17.4% of them have 1-2 years of experience, 21.1% are using for 2-4 years, 12.6% of them are internet users for 4-6 years whereas a major sector of the teachers (39.9%) have been using internet for 6 years and above. Of the 667 sample, 98.7% of the teachers have at least one or more ICT devices viz. Over Head Projector, LCD Projector, Interactive White Board, Television, DVD Player, Public Address System in their institution for facilitating learning, whereas 1.3% of them are deprived of that facility.

As many as 86.5% of the sample teachers have computer access in their colleges for facilitating learning, whereas the remaining 13.5% are not provided with that facility. Of the sample teachers, 75.7% are provided with internet connectivity in their colleges for facilitating learning, whereas 24.3% of them are not.

It is important to note that, of the 667 sample teachers, only 53 (7.9%) have undergone ICT training programmes for integrating ICT into teaching. On the other hand, a vast majority of 614 teachers (92.1%) have not received any ICT training programmes.

4.3. Inferential Analysis of Data

Inferential statistics refers to the statistical procedures, used for drawing inferences about the properties of population from sample data. For the present study, ‘t’ test and ‘F’ test are used to obtain inferences related to the sample.

Hypothesis: 1 ($H_0$1)

The teachers of Arts and Science Colleges of Bharathidasan University region do not have any ICT Knowledge.

Table 4.2

Mean ICT Knowledge Score of the Whole Sample

Variable	Number of Teachers	Maximum Obtainable Score	Mean
ICT Knowledge	667	38	19.08

The Table 4.2 shows the mean ICT Knowledge score of the whole sample of 667 teachers of Arts and Science Colleges of Bharathidasan University region. The mean ICT Knowledge score is 19.08 against the maximum obtainable score of 37. It indicates that the level of ICT knowledge of Arts and Science College teachers of Bharathidasan University region is AVERAGE. Hence, the hypothesis, "*The teachers of Arts and Science Colleges of Bharathidasan University region do not have any ICT Knowledge*" is REJECTED. In order to get a better picture, the ICT Knowledge scores are further analysed in terms of levels.

Table 4.2(a)

Analysis of the Mean ICT Knowledge Score of the Whole Sample in terms of Levels

Levels	Scores	Number of Teachers	Percentage
Low	0-11	90	13.49
Average	12-24	430	64.46
High	25-37	147	22.03

Table 4.2(a) reveals that the levels of ICT Knowledge of teachers of Arts and Science Colleges of Bharathidasan University region range from Low to High. Out of 667 teachers, 90 (13.49%) have a Low level ICT Knowledge with scores between 0 and 11, 430 (64.46%) have an Average level ICT

Knowledge with scores between 12 and 24, whereas 147 (22.03%) have High level ICT Knowledge with scores between 25 and 37. It is important to note that a maximum of 430 teachers (64.46%) come under the Average level ICT Knowledge category. Hence, the hypothesis, *"The Information and Communication Technology Knowledge Level of the teachers of Arts and Science Colleges of Bharathidasan University region is low"* is REJECTED.

Hypothesis: 2 (H_02)

The teachers of Arts and Science Colleges of Bharathidasan University region do not have any ICT Skills.

Table 4.3

Analysis of the Mean ICT Skills Score of the Whole Sample

Variable	Number of Teachers	Maximum Obtainable Score	Mean
ICT Skills	667	570	225.39

Table 4.3 shows the mean ICT Skills score of the whole sample of 667 teachers of Arts and Science Colleges of Bharathidasan University region. The mean ICT Skills score is 225.39 as against the maximum obtainable score of 570. It indicates that the teachers of Arts and Science Colleges of Bharathidasan University region are moderately skilled in ICT. Hence the hypothesis, "*The teachers of Arts and Science Colleges of Bharathidasan University region do not have any ICT Skills"* is REJECTED. In order to get a better picture, the ICT Skills scores are further analysed in terms of levels.

Table 4.3(a)

Analysis of the Mean ICT Skills Score of the Whole Sample in terms of Levels

Levels	Scores	Number of Teachers	Percentage
Low	0-189	247	37.03
Moderately Skilled	190-379	358	53.67
Highly Skilled	380-570	62	09.29

Table 4.3(a) reveals that the status of the teachers of Arts and Science Colleges of Bharathidasan University region ranges from Low to Highly Skilled. Out of 667 Arts and Science College teachers, 247 (37.03%) belong to Low level ICT Skills with scores between 0 and 189, 358 (53.67%) are Moderately Skilled with scores between 190 and 379, whereas 62 (09.29%) with scores between 380 and 570 are Highly Skilled. It is important to note that, a maximum of 358 teachers (53.67%) come under the Moderate level ICT Skills category. Hence, the hypothesis, *"The teachers of Arts and Science Colleges of Bharathidasan University region do not have any ICT Skills"* is REJECTED.

Hypothesis: 3 ($H_0$3)

The Information and Communication Technology Attitude of teachers of Arts and Science Colleges of Bharathidasan University region is UNFAOURABLE.

Table 4.4

Analysis of the Mean ICT Attitude Score of the Whole Sample

Variable	Number of Teachers	Maximum Obtainable Score	Mean
ICT Attitude	667	185	121.80

Table 4.4 shows the mean ICT Attitude score of the whole sample of 667 teachers of Arts and Science Colleges of Bharathidasan University region. The mean ICT Attitude score is 121.80 as against the maximum obtainable score of 185. It indicates that, the teachers of Arts and Science Colleges of Bharathidasan University region do not possess unfavourable attitude towards ICT. Hence, the hypothesis, *"The Information and Communication Technology Attitude of teachers of Arts and Science Colleges of Bharathidasan University region is UNFAOURABLE",* is REJECTED. In order to get a better picture, the ICT Attitude scores are further analysed in terms of levels.

Table 4.4(a)

Analysis of the Mean ICT Attitude Score of the Whole Sample in terms of Levels

Categories	Scores	No. of Teachers	Percentage
Unfavourable	0-62	7	01.04
Neutral	63-124	310	46.47
Favourable	125-185	350	52.47

Table 4.4(a), reveals that the levels of ICT Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region ranges from Unfavourable to Favourable. Out of 667 Arts and Science College teachers, only 7 (01.04%) teachers have unfavourable attitude with scores between 0 and 62, 310 (46.47%) teachers have neutral attitude with scores between 63 and 124, whereas 350 (52.47%) teachers have favourable attitude with scores between 125 and 185. It is important to note that, a maximum of 350 teachers (52.47%) come under the favourable ICT attitude category. Hence, the hypothesis, *"The Information and Communication Technology Attitude of teachers of Arts and Science Colleges of Bharathidasan University region is UNFAVOURABLE"* is REJECTED.

Hypothesis: 4 ($H_0$4)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations.

In order to find out whether there is a significant difference among the mean ICT Knowledge scores of the teachers of different designations viz. Lecturer, Assistant Professor and Associate Professor working in Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.5

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	97.763	2	48.881	1.223*
Within Groups	26537.026	665	39.965	

*Not significant at 0.05 level

From the Table 4.5 it is evident that the F-value (1.223) is not significant at 0.05 level with df (2,665). It indicates that, the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their designations do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations"* is NOT REJECTED.

For a better understanding, the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their designations are presented in the following table:

Table 4.5(a)

Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations

Designations	N	Mean
Lecturer	81	18.12
Assistant Professor	452	19.29
Associate Professor	134	18.93

Table 4.5(a), presents the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their designations. It indicates that the mean ICT Knowledge scores of the teachers of Lecturer, Assistant Professor and Associate Professor cadres are 18.12, 19.29 and 18.93 respectively. On the basis of the above analysis, it is concluded that the Assistant Professors are slightly better in their ICT Knowledge than their counterparts.

Hypothesis: 5 ($H_0$5)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Sex.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the male and female teachers of Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.6

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Sex

Variable	Sex	N	Mean	SD	't'
ICT Knowledge	Male	290	19.01	6.410	0.247*
	Female	377	19.13	6.265	

* Not significant at 0.05 level

From Table 4.6 it is evident that the t-value (0.247) is not significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the male and female teachers of Arts and Science Colleges of Bharathidasan University region do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Sex"* is NOT REJECTED.

Further, it can be seen that the mean ICT Knowledge score of the female teachers (19.13) is slightly higher than that of the male teachers (19.01). It is therefore concluded that the female teachers of Arts and Science Colleges of Bharathidasan University region are slightly better in their ICT Knowledge than the male teachers of Arts and Science Colleges of Bharathidasan University region.

Hypothesis: 6 ($H_0$6)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age.

In order to find out whether there is a significant difference among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region belonging to different age groups viz., 24-34, 35-45 and 45-56 , the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.7

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	444.965	2	222.483	5.641*
Within Groups	26189.824	665	39.443	

*Significant at 0.05 level

From Table 4.7, it is evident that the F-value (5.641) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their age differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age"* is REJECTED.

As significant difference is found among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their age, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.7(a)

Duncan's Post Hoc Analysis of the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age

Age	N	Subset for Alpha = 0.05	
		1	2
35-45	249	18.37	
46-56	157	18.52	
24-34	261		20.10

Table 4.7(a) shows that the mean ICT Knowledge scores, 18.37 and 18.52 are located in subset 1 and 20.10 is located in subset 2 at 0.05 level. It is understood that there is no significant difference in the mean ICT Knowledge scores of the teachers of the age groups 35-45 and 46-56 whereas significant difference has been found in the mean ICT Knowledge scores of the teachers of 35-45 and 24-34 age groups as well as 46-56 and 24-34 age groups. Among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region of 24-34, 35-45 and 46-56 age groups viz. 20.10, 18.37 and 18.52, the mean ICT Knowledge score of the teachers of 24-34 age group is higher than that of their counterparts. It is therefore concluded that the teachers of 24-34 age group are better in their ICT Knowledge than the teachers of 35-45 and 46-56 age groups.

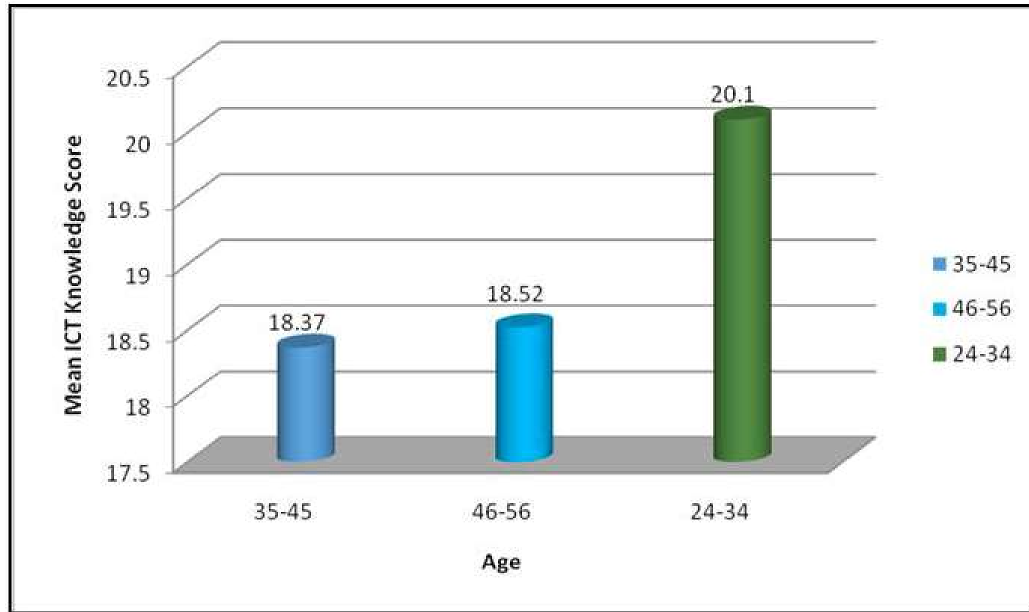


Figure 4.1: Cylinder Chart showing the mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age

Hypothesis: 7 ($H_0$7)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications.

In order to find out whether there is a significant difference among the mean ICT Knowledge score of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different academic qualifications (viz. M.A., M.Sc., M.Com. and M.B.A.), the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.8

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	1713.074	2	856.537	22.821*
Within Groups	24921.715	665	37.533	

*Significant at 0.05 level

From Table 4.8, it is evident that the F-value (22.821) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their academic qualification differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications"* is REJECTED.

As significant difference is found among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their academic qualifications, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.8(a)

Duncan's Post Hoc Analysis of the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

Academic Qualifications	N	Subset for Alpha = 0.05	
		1	2
M.A.	215	16.82	
M.Com.& M.B.A.	141		19.46
M.Sc.	311		20.47

Table 4.8(a) shows that the mean ICT Knowledge scores, 16.82 is located in subset 1 whereas 19.46 and 20.47 are located in subset 2 at 0.05 level. It is understood that there is no significant difference in the mean ICT Knowledge scores of the teachers with M.Com. & M.B.A. and with M.Sc. degrees. On the other hand, significant difference has been found in the mean ICT Knowledge scores of the teachers with M.A., M.Com & M.B.A. degrees. Similarly, significant difference has been found in the mean ICT Knowledge scores of the teachers with M.A. and M.Sc. degrees.

From the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing M.A., M.Com. & M.B.A. and M.Sc. degrees, viz.,16.82, 19.46 and 20.47 respectively, the mean ICT Knowledge score of the teachers with M.Sc. degree is higher than that of their counterparts. It is therefore concluded that the teachers with M.Sc. degree are better in their ICT Knowledge, than the teachers with M.A., M.Com. & M.B.A. degrees.

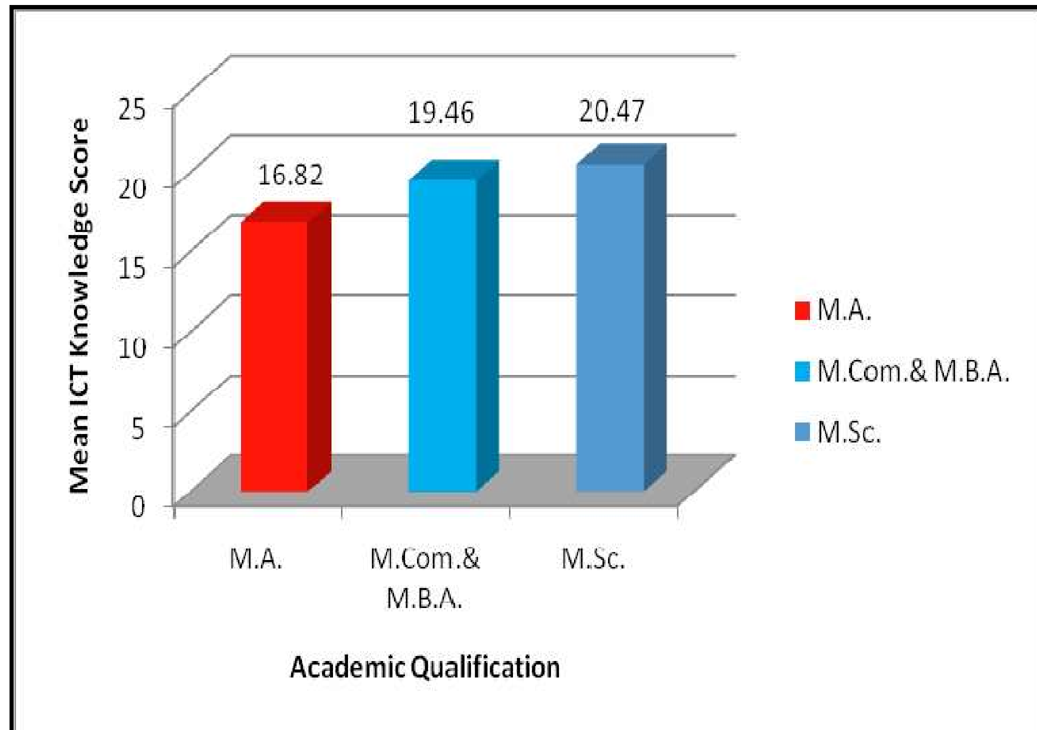


Figure 4.2: Column Chart showing the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

Hypothesis: 8 ($H_0$8)

There is no significant difference in the ICT Knowledge Scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications.

In order to find out whether there is a significant difference among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different professional qualifications viz. B.Ed., M.Ed., any other and none, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.9

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	1354.710	3	451.570	11.843*
Within Groups	25280.078	664	38.130	

*Significant at 0.05 level

From Table 4.9, it is evident that F-value (11.843) is significant at 0.05 level with df (3,664). It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications"* is REJECTED.

As significant difference is found among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.9(a)

Duncan's Post Hoc Analysis of the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications

Professional Qualifications	N	Subset for Alpha = 0.05		
		1	2	3
None	399	15.74		
B.Ed.	194	17.87	17.87	
M.Ed.	46		19.80	
Any other	28			22.61

Table 4.9(a) shows that, the mean ICT Knowledge scores, 15.74 and 17.87 are located in subset 1; 17.87 and 19.80 are located in subset 2 and 22.61 is located in subset 3 at 0.05 level. It is understood that there is significant difference in the mean ICT Knowledge scores of the teachers with no professional degree and the scores of the teachers with B.Ed. degree. Significant difference has been found in the mean ICT Knowledge scores of the teachers of above two categories and the scores of the teachers with M.Ed. degree. Similarly, significant difference has been found in the mean ICT Knowledge scores of the teachers of the above three categories and the mean scores of the teachers with other degrees viz. PGDCA, MCA etc.

The mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing no professional degree, B.Ed., M.Ed., and other degrees viz. PGDCA, MCA etc. are 15.74, 17.87, 19.80 and 22.61 respectively. The mean ICT Knowledge score of the teachers with other degrees viz. PGDCA, MCA etc., is higher than that of their counterparts.

It is therefore concluded that, the teachers with other professional degrees viz. PGDCA, MCA etc., are better in their ICT knowledge than the teachers with no professional degree viz., B.Ed. and M.Ed.

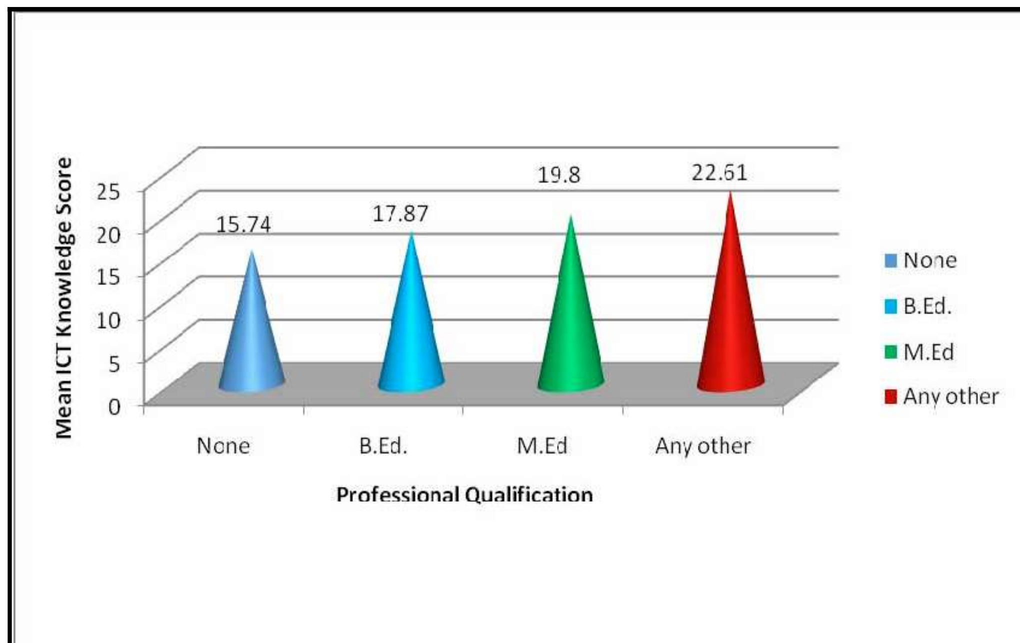


Figure 4.3: Cone Chart showing the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications

Hypothesis: 9 ($H_0$9)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications.

In order to find out whether there is a significant difference among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different research qualifications viz. M.Phil., Ph.D., both M.Phil. and Ph.D. and teachers with no such degrees, above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.10

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	144.592	3	48.197	1.206*
Within Groups	26490.197	664	39.955	

*Not Significant at 0.05 level

From Table 4.10, it is evident that the F-value (1.206) is not significant at 0.05 level with df (3,664). It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their research qualifications do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications"* is NOT REJECTED.

For a better understanding, the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their research qualifications are presented in the following table:

Table 4.10(a)

Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications

Research Qualifications	N	Mean
None	37	17.95
M.Phil.	351	18.93
Ph.D.	131	18.95
Both M.Phil. and Ph.D.	148	19.90

Table 4.10(a), presents the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their research qualifications. It indicates that the mean ICT Knowledge scores of the teachers with no research degree, M.Phil., Ph.D., both M.Phil. and Ph.D. are 17.95,18.93, 18.95 and 19.90 respectively. The mean ICT Knowledge score of the teachers with both M.Phil. and Ph.D. is 19.90 which is higher than that of the teachers with M.Phil, Ph.D and no such degrees. Hence, it is concluded that teachers with both M.Phil. and Ph.D. degrees are better in their ICT Knowledge than their counterparts.

Hypothesis: 10 ($H_0$10)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution, in which they are employed.

In order to find out whether there is a significant difference among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, working at colleges of different categories viz. Government, Government-Aided and Self-Financing, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.11

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	233.995	2	116.997	2.943*
Within Groups	26400.794	665	39.760	

*Significant at 0.05 level

From Table 4.11, it is evident that the F-value (2.943) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the category of the institution differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution, in which they are employed"* is REJECTED.

As significant difference is found among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the category of the institution. Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.11(a)

Duncan's Post Hoc Analysis of the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution

Category of the Institution	N	Subset for Alpha = 0.05	
		1	2
Government	208	18.48	
Self-Financing	302	18.97	18.97
Government-Aided	157		20.08

Table 4.11(a) shows that the mean ICT Knowledge scores, 18.48 and 18.97 are located in subset 1 whereas 18.97 and 20.08 are located in subset 2 at 0.05 level. It is understood that there is no significant difference in the mean ICT Knowledge scores of the teachers working in Government and Self-financing colleges whereas significant difference has been found in the mean ICT Knowledge scores of the teachers working in the above two category colleges and the teachers working in the Government-aided colleges.

The mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region working in Government, Self-financing and Government-aided colleges are 18.48, 18.97 and 20.28 respectively. The mean ICT Knowledge score of the teachers working in Government-aided colleges is higher than that of their counterparts. It is therefore concluded that the teachers working in Government-aided colleges have better ICT Knowledge than the teachers working in Government and Self-financing colleges.

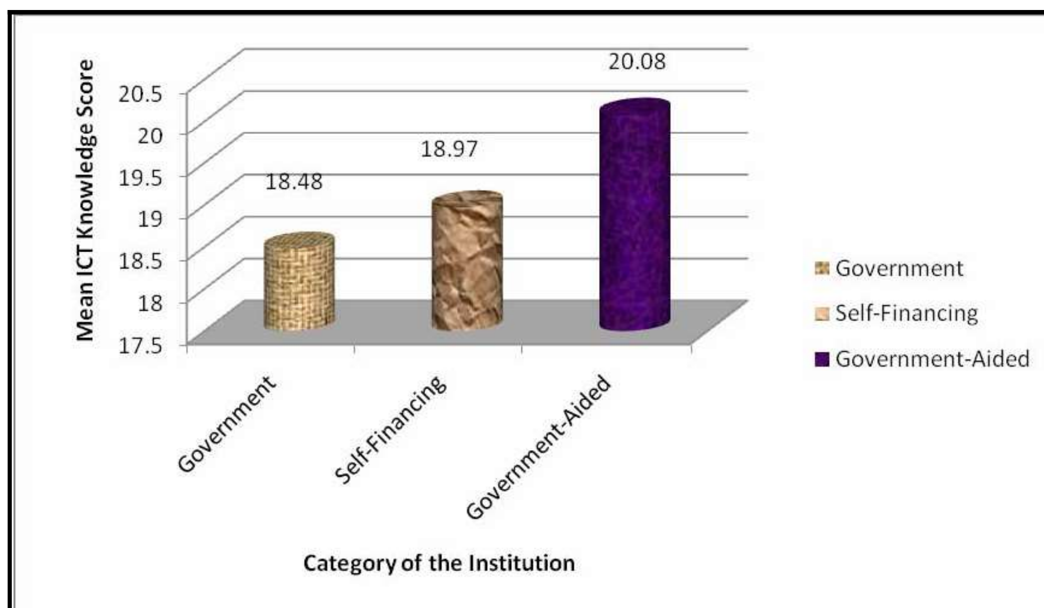


Figure 4.4: Cylinder Chart showing the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution

Hypothesis: 11 ($H_0$11)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution, in which they are employed.

In order to find out whether there is a significant difference among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region working at different types of the colleges, viz. men, women and co-educational, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.12

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	41.368	2	20.684	0.516*
Within Groups	26593.421	665	40.050	

*Not Significant at 0.05 level

From Table 4.12, it is evident that the F-value (0.516) is not significant at 0.05 level with df (2,665). It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the type of the institution do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution, in which they are employed"* is NOT REJECTED.

For a better understanding, the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the type of institution are presented in the following table:

Table 4.12(a)

Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution

Type of Institution	N	Mean
Men	25	20.28
Women	237	19.14
Co-educational	405	18.97

Table 4.12(a) presents the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the type of institution. It indicates that the mean ICT Knowledge scores of the teachers working in Men, Women and Co-educational institutions are 20.28, 19.4 and 18.97 respectively.

The mean ICT Knowledge score of teachers working in Men’s Colleges (20.28) is higher than that of the teachers working in Women’s and Co-Educational Colleges. Hence, it is concluded that the teachers working in Men’s colleges are better in their ICT Knowledge than their counterparts.

Hypothesis: 12 ($H_0$12)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution, in which they are employed.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the teachers of autonomous and non-autonomous Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.13

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution

Variable	Nature of Institution	N	Mean	SD	't'
ICT Knowledge	Autonomous	268	20.10	6.660	3.446*
	Non-Autonomous	399	18.39	5.999	

* Significant at 0.05 level

From Table 4.13, it is evident that the 't'-value (3.446) is significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution, in which they are employed"* is REJECTED.

Further, it can be seen that the mean ICT Knowledge score of the teachers working in autonomous colleges is 20.10, which is higher than that of the teachers belonging to non-autonomous colleges (18.39). It is therefore concluded that the teachers working in autonomous Arts and Science Colleges are better in their ICT Knowledge than the teachers working in non-autonomous Arts and Science Colleges of Bharathidasan University region.

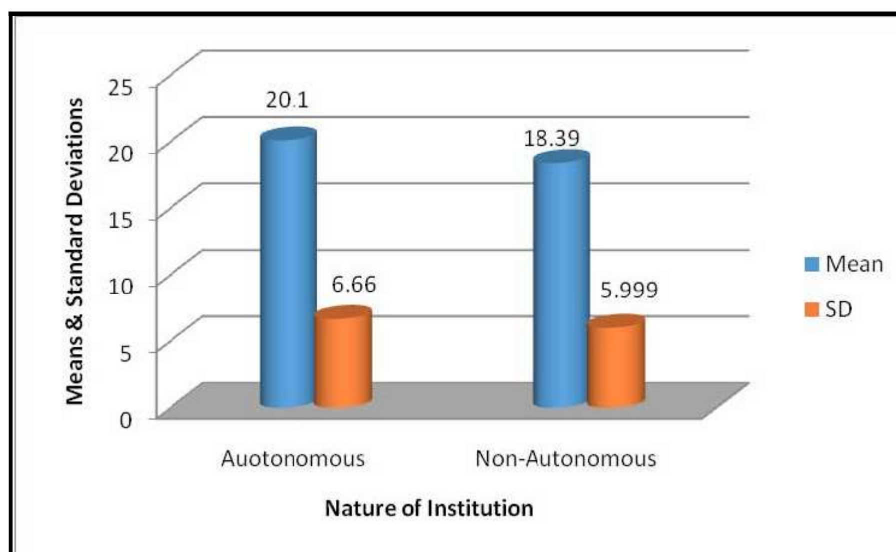


Figure 4.5: Cylinder Chart showing the Means and Standard Deviations of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution

Hypothesis: 13 ($H_0$13)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Locality of the Institution, in which they are employed.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the teachers working in urban and rural Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.14

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Locality of the Institution

Variable	Locality of the Institution	N	Mean	SD	't'
ICT Knowledge	Urban	373	19.58	6.192	2.331*
	Rural	294	18.44	6.442	

* Significant at 0.05 level

From Table 4.14, it is evident that the t-value (2.331) is significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Locality of the Institution, in which they are employed"* is REJECTED.

Further, it can be seen that the mean ICT Knowledge score of the teachers working in urban colleges (19.58) is slightly higher than the mean score (18.44) of the teachers belonging to rural colleges. It is therefore concluded that the teachers working in urban Arts and Science Colleges are better in their ICT Knowledge than the teachers working in rural Arts and Science Colleges of Bharathidasan University region.

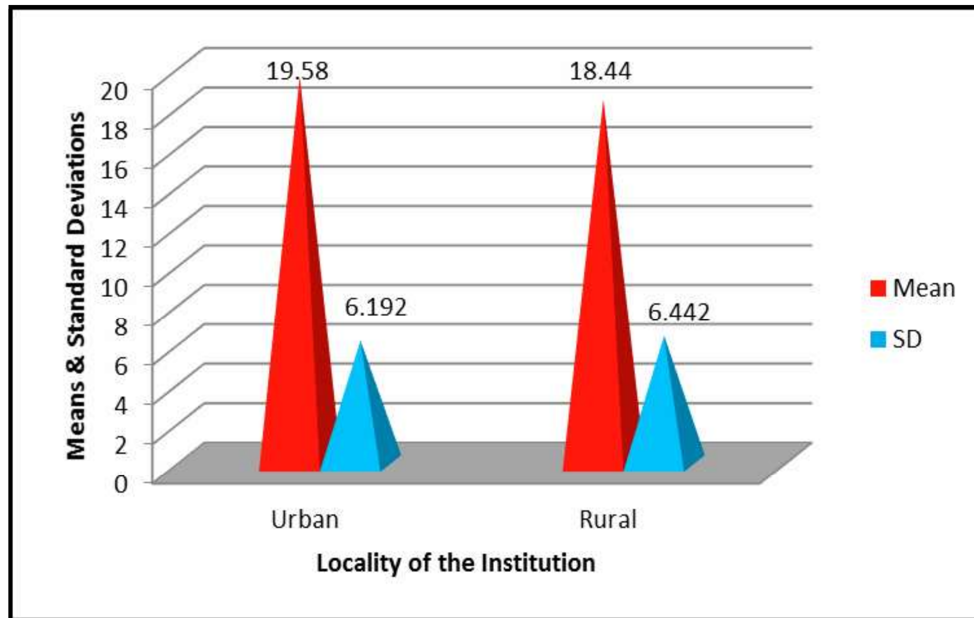


Figure 4.6: Cone Chart showing Means and Standard Deviations of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Locality of the Institution

Hypothesis: 14 ($H_0$14)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of availability of personal computer at home, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.15

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home

Variable	Availability of Personal Computer at Home	N	Mean	SD	't'
ICT Knowledge	Yes	531	19.66	6.136	4.769*
	No	136	16.81	6.554	

* Significant at 0.05 level

From the Table 4.15, it is evident that the t-value (4.769) is significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home",* is REJECTED.

Further, it can be seen that the mean ICT Knowledge score of the teachers who have personal computer at home (19.66) is higher than the mean score of the teachers who do not have personal computers at home (16.81). It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region who have personal computer at home are better in their ICT Knowledge than the teachers who do not possess personal computer at home.

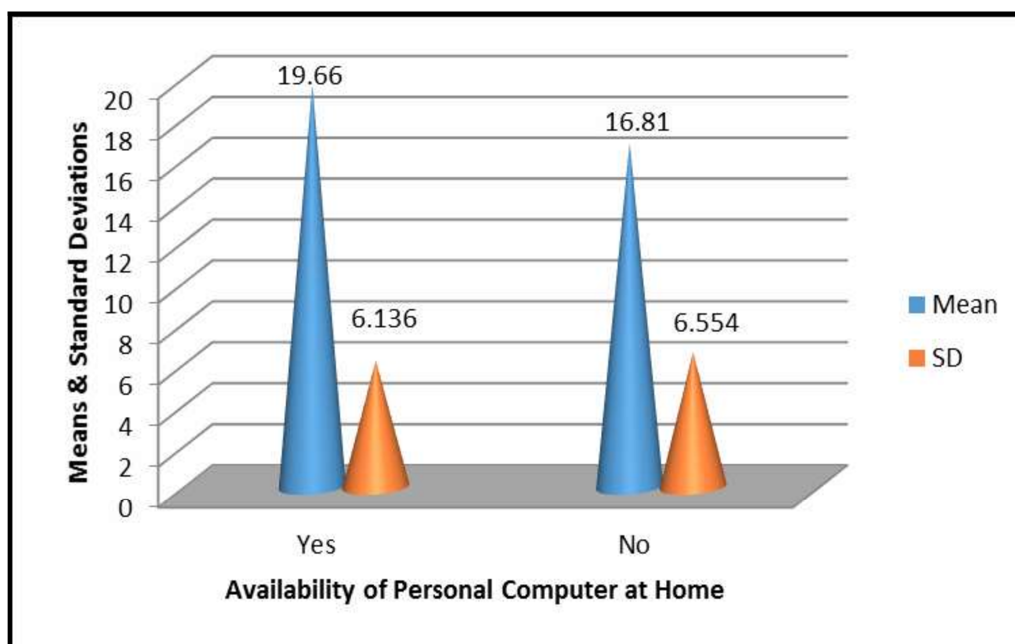


Figure 4.7: Cone Chart showing Means and Standard Deviations of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home

Hypothesis: 15 ($H_0$15)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of availability of internet connectivity at home, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.16

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home

Variable	Availability of Internet Connectivity at Home	N	Mean	SD	't'
ICT Knowledge	Yes	451	19.91	6.353	4.969*
	No	216	17.35	5.915	

* Significant at 0.05 level

From Table 4.16, it is evident that the t-value (4.969) is significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home",* is REJECTED.

Further, it can be seen that, the mean ICT Knowledge score of the teachers who have internet connectivity at home (19.91) is higher than the mean score of the teachers who do not have internet connectivity at home (17.35). It is therefore concluded that, the teachers of Arts and Science Colleges of Bharathidasan University region who have internet connectivity at home are better in their ICT Knowledge than the teachers who do not have internet connectivity at home.

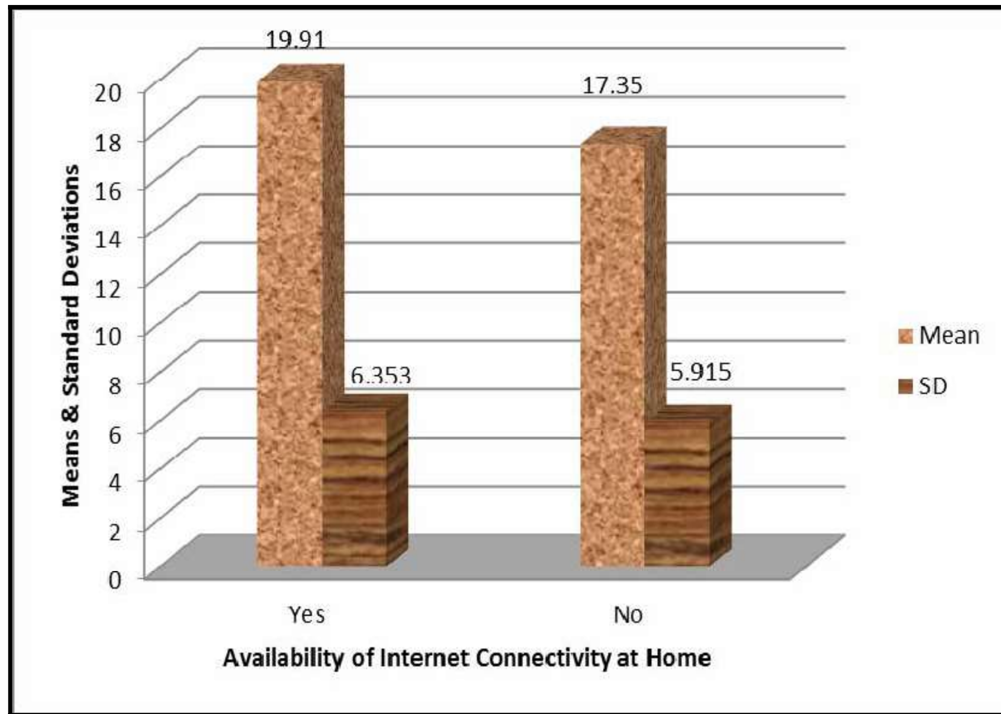


Figure 4.8: Column Chart showing Means and Standard Deviations of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home

Hypothesis: 16 ($H_0$16)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of internet access on mobile, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.17

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile

Variable	Internet Access on Mobile	N	Mean	SD	't'
ICT Knowledge	Yes	442	20.05	5.820	5.697*
	No	225	17.17	6.833	

* Significant at 0.05 level

From Table 4.17, it is evident that the t-value (5.697) is significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile"* is REJECTED.

Further, it can be seen that the mean ICT Knowledge score of the teachers, who have internet access on mobile (20.05) is higher than the mean score of the teachers, who do not have internet access on mobile (17.17). It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region, who have internet access on mobile are better in their ICT Knowledge than the teachers, who do not have internet access on mobile.

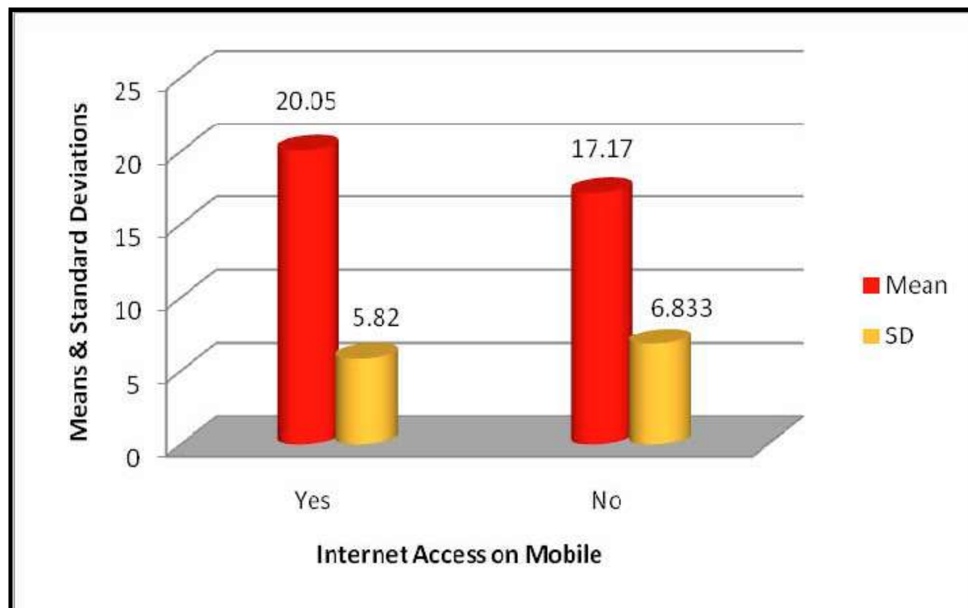


Figure 4.9: Cylinder Chart showing Means and Standard Deviations of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile

Hypothesis: 17 ($H_0$17)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer.

In order to find out whether there is a significant difference among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, with different lengths of experience with computer viz. Less than 1 year, 1-2 years, 2-4 years, 4-6 years and 6 years and above, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.18

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	4713.958	4	1178.489	35.590*
Within Groups	21920.831	663	33.113	

*Significant at 0.05 level

From Table 4.18, it is evident that the F-value (35.590) is significant at 0.05 level with df (4,663). It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of experience with computer differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer"* is REJECTED.

As significant difference is found among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of experience with computer, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.18(a)

Duncan's Post Hoc Analysis of the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer

Length of Experience with Computer	N	Subset for Alpha = 0.05			
		1	2	3	4
Less than 1 year	53	14.53			
1-2 years	90	14.96			
2-4 years	112		17.50		
4-6 years	74			19.19	
6 years and above	338				21.39

Table 4.18(a) shows that the mean ICT Knowledge scores, 14.53 and 14.96 are located in subset 1, 17.50 is located in subset 2 and 19.19 is located in subset 3 while 21.39 lies in subset 4 at 0.05 level. It is understood that there is no significant difference in the mean ICT Knowledge scores of the teachers with experience less than 1 year and teachers with 1-2 years of experience. Significant difference has been found in the mean ICT Knowledge scores of the teachers of above two categories and the mean scores of the teachers with 2-4 years of experience. Similarly significant difference has been found in the mean ICT Knowledge scores of the above three cases with the mean scores of the teachers with 4-6 years of experience. Significant difference has been found in the mean ICT Knowledge scores of the teachers of above four categories with the mean scores of the teachers with experience for 6 years and above.

The mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing computer experience for less than 1 year, 1-2 years, 4-6 years and 6 years and above are 14.53,

14.96, 17.50, 19.19 and 21.39 respectively. The mean ICT Knowledge scores of the teachers with 6 years and above experience is higher than that of their counterparts. It is therefore concluded that the teachers with 6 years and above experience are better in their ICT Knowledge than the teachers with lower experience span.

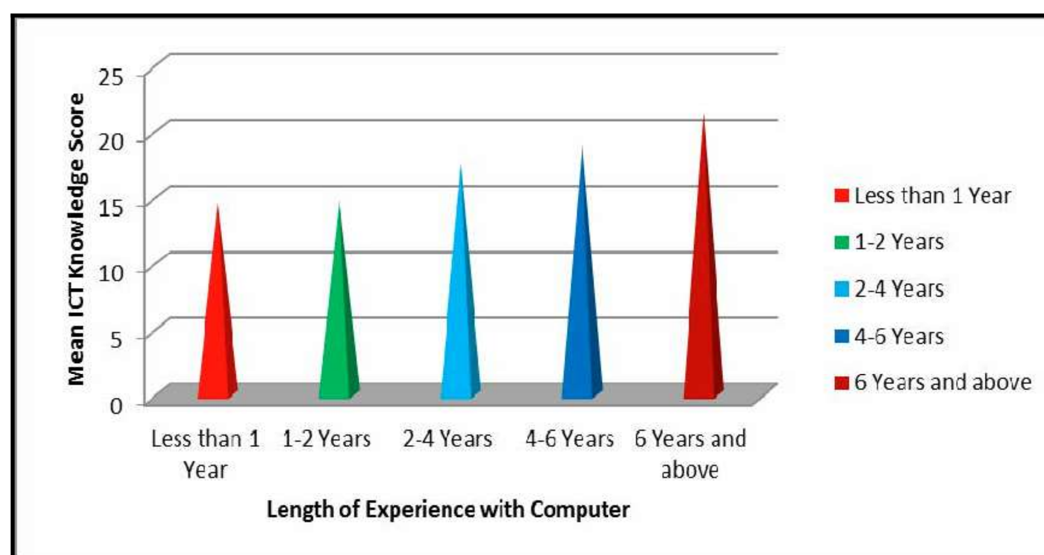


Figure 4.10: Cone Chart showing the mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer

Hypothesis: 18 ($H_0$18)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage.

In order to find out whether there is a significant difference among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region with different frequency of computer usage viz. daily, on alternate days, once in a fortnight or so, once in a month or so and never, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.19

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	3533.446	4	883.362	25.314*
Within Groups	23101.343	663	34.896	

*Significant at 0.05 level

From Table 4.19, it is evident that the F-value (25.314) is significant at 0.05 level with df (4,663). It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their frequency of computer usage differ significantly. Hence, the null hypothesis *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage"* is REJECTED.

As significant difference is found among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their frequency of computer usage, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.19(a)

Duncan's Post Hoc Analysis of the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage

Frequency of Computer Usage	N	Subset for Alpha = 0.05		
		1	2	3
Never	10	12.40		
Once in a month or so	42		16.10	
Once in a fortnight or so	76		16.55	
On alternate days	189		17.20	
Daily	350			21.19

Table 4.19(a) shows that the mean ICT Knowledge score 12.40 is located in subset 1 whereas 16.10, 16.55 and 17.20 are located in subset 2 and 21.19 is located in subset 3 at 0.05 level. It is understood that there is significant difference in the mean ICT Knowledge scores of the teachers, who never use the computer and the scores of the teachers who use the computer once in a month or so. There is no significant difference in the mean ICT Knowledge scores of the teachers of above two categories and the scores of the teachers who use the computer once in a month or so. There is a significant difference in the mean ICT Knowledge scores of the teachers of the above three cases and the mean ICT Knowledge scores of the teachers who use the computer on alternate days. There is a significant difference in the mean ICT Knowledge scores of the teachers of the above four cases and the mean ICT Knowledge scores of the teachers who use the computer daily.

From the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who use the computer never (12.40), once in a month or so (16.10), once in a fortnight or so (16.55), on alternate days (17.20) and daily (21.19), the mean ICT Knowledge scores of the teachers who use computer daily is higher than that of their counterparts. It is therefore concluded that the teachers who use computers daily are better in their ICT Knowledge than the teachers of remaining categories.

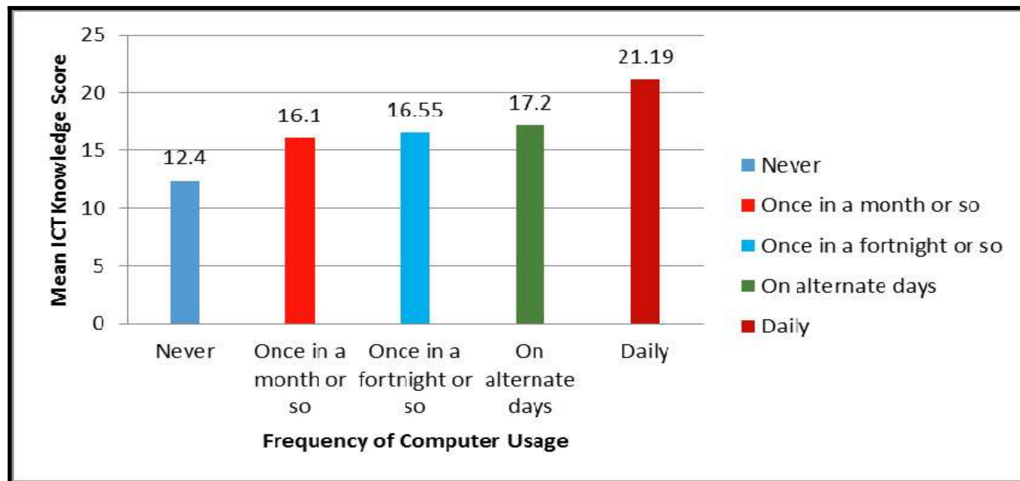


Figure 4.11: Column Chart showing Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage

Hypothesis: 19 ($H_0$19)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience.

In order to find out whether there is a significant difference among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, with different lengths of internet experience viz. Less than 1 year, 1-2 years, 2-4 years, 4-6 years and 6 years and above, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.20

Summary of ANOVA showing the Significance of Difference among the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	4983.200	4	1245.800	38.090*
Within Groups	21651.588	663	32.706	

*Significant at 0.05 level

From Table 4.20, it is evident that the F-value (38.090) is significant at 0.05 level with df (4,663). It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of internet experience differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience"* is REJECTED.

As significant difference is found among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of internet experience, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.20(a)

Duncan's Post Hoc Analysis of the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Length of Internet Experience

Length of Internet Experience	N	Subset for Alpha = 0.05		
		1	2	3
Less than 1 year	60	14.62		
1-2 years	116	15.47		
2-4 years	141		18.04	
4-6 years	84			20.32
6 years and above	266			21.82

Table 4.20(a) shows that, the mean ICT Knowledge scores, 14.62 and 15.47 are located in subset 1, 18.04 is located in subset 2 and 20.32 as well 21.82 are located in subset 3 at 0.05 level. It is understood that there is significant difference in the mean ICT Knowledge scores of the teachers with internet experience of less than 1 year and teachers with 1-2 years of experience. Significant difference has been found in the mean ICT Knowledge scores of the teachers of the above two groups and the teachers with 2-4 years of experience. There is a significant difference between the mean ICT Knowledge scores of the teachers of the above three groups and the teachers with 4-6 years of experience. Similarly, significant difference has been found in the mean ICT Knowledge scores of the teachers of the above four groups and the teachers with experience for 6 years and above.

From the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing internet experience less than 1 year, 1-2 years, 4-6 years and 6 years and above are 14.62, 15.47, 18.04, 20.32 and 21.82 respectively. The mean ICT Knowledge scores of the teachers with 6 years and above experience is higher than that of

their counterparts. It is therefore concluded that the teachers with internet experience for 6 years and above, are better in their ICT Knowledge than the teachers with lower internet experience span.

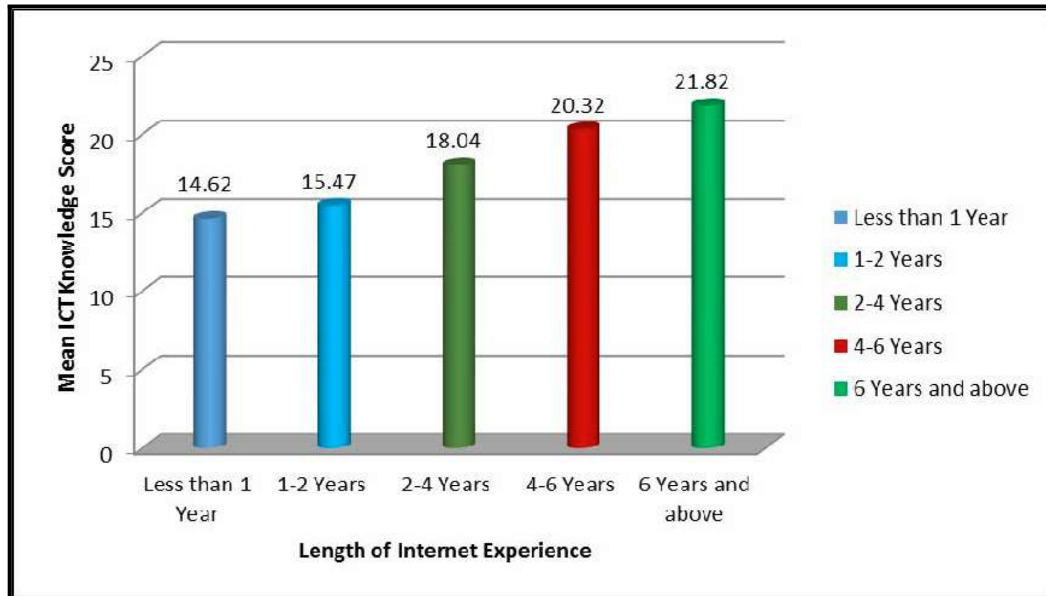


Figure 4.12: Cylinder Chart showing the Mean ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience

Hypothesis: 20 ($H_0$20)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of ICT Devices in their Institutions for Facilitating Learning.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, with and without ICT devices in their institutions for facilitating learning, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.21

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of ICT Devices in their Institutions

Variable	Availability of ICT Devices in Institution	N	Mean	SD	't'
ICT Knowledge	Yes	658	19.06	6.312	0.705*
	No	9	20.56	7.418	

* Not significant at 0.05 level

From Table 4.21, it is evident that the t-value (0.705), is not significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of ICT Devices in their Institutions for Facilitating Learning",* is NOT REJECTED.

Further, it can be seen that the mean ICT Knowledge score of the teachers who do not have ICT devices in their institutions (20.56) is higher than the mean score (19.06) of the teachers who have ICT devices in their institutions. It is therefore concluded that, the teachers of Arts and Science Colleges of Bharathidasan University region who do not have ICT devices in their institutions are slightly better in their ICT Knowledge than the teachers who have ICT devices in their institutions for facilitating learning.

Hypothesis: 21 ($H_0$21)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges for Facilitating Learning.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who have and who do not have computer access at their colleges for facilitating learning, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.22

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges

Variable	Availability of Computer Access at College	N	Mean	SD	't'
ICT Knowledge	Yes	577	19.28	6.314	2.105*
	No	90	17.78	6.267	

* Significant at 0.05 level

From Table 4.22, it is evident that the t-value (2.105), is significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges for Facilitating Learning"* is REJECTED.

Further, it can be seen that the mean ICT Knowledge score of the teachers who have computer access at their colleges (19.28) is higher than the mean score (17.78) of the teachers who do not have computer access at their colleges. It is therefore concluded that, the teachers of Arts and Science Colleges of Bharathidasan University region who have computer access at their colleges are better in their ICT Knowledge than the teachers who do not possess computer access at their colleges.

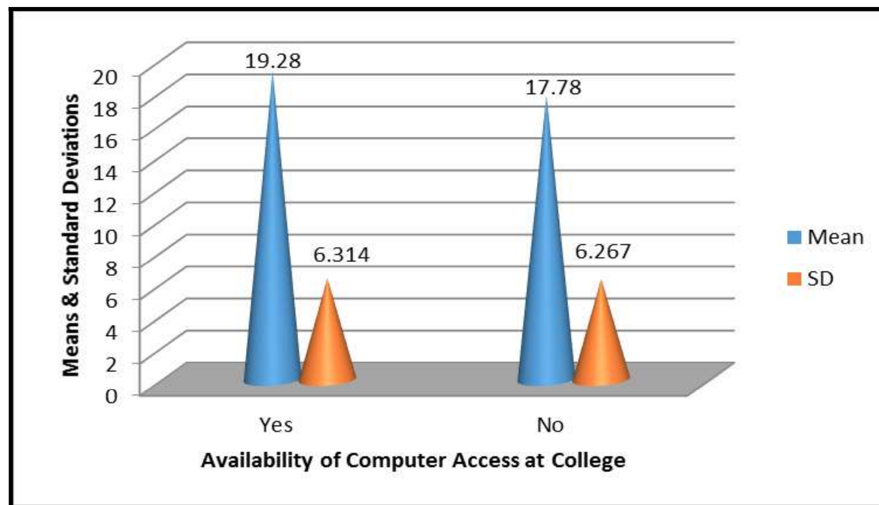


Figure 4.13: Cone Chart showing Means and Standard Deviations of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges

Hypothesis: 22 ($H_0$22)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges for Facilitating Learning.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, with and without internet connectivity at their college for facilitating learning, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.23

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges

Variable	Availability of Internet Connectivity at College	N	Mean	SD	't'
ICT Knowledge	Yes	505	19.25	6.377	1.227*
	No	162	18.55	6.144	

* Not significant at 0.05 level

From Table 4.23, it is evident that t-value (1.227) is not significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges for Facilitating Learning"* is NOT REJECTED.

Further, it can be seen that the mean ICT Knowledge score of the teachers who have internet connectivity at college (19.25) is higher than the mean score (18.55) of the teachers who do not have internet connectivity at college. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region, who have internet connectivity at college are slightly better in their ICT Knowledge than the teachers, who do not have internet connectivity at college.

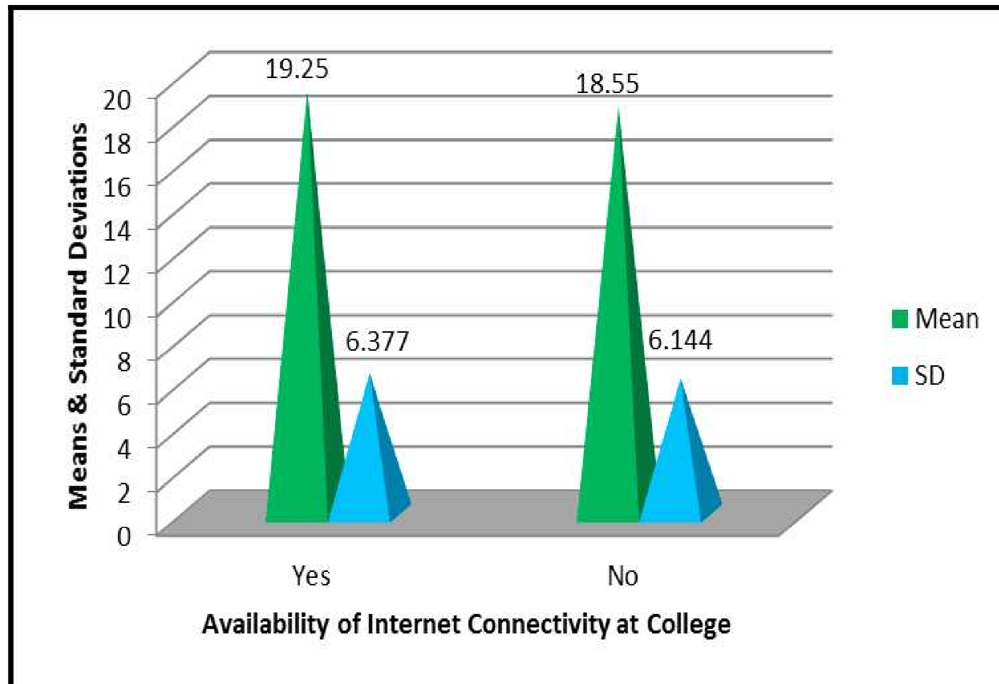


Figure 4.14: Cone Chart showing Means and Standard Deviations of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges

Hypothesis 23 ($H_0$23)

There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Participation in ICT Training programmes.

In order to find out whether there is a significant difference between the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who have and who have not undergone ICT training programmes, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.24

Means, Standard Deviations and t-value of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Participation in ICT Training Programmes

Variable	Participation in ICT Training Programmes	N	Mean	SD	't'
ICT Knowledge	Yes	53	21.02	5.882	2.335*
	No	614	18.91	6.337	

* Significant at 0.05 level

From Table 4.24, it is evident that the t-value (2.335) is significant at 0.05 level with df = 665. It indicates that the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region sub-grouped on the basis of their Participation in ICT Training Programmes"* is REJECTED.

Further, it can be seen that the mean ICT Knowledge score of the teachers who have undergone ICT training programme (21.02) is higher than the mean score (18.91) of the teachers who have not undergone ICT training programme. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region who have undergone ICT training programmes are better in their ICT Knowledge than the teachers who have not undergone ICT training programmes.

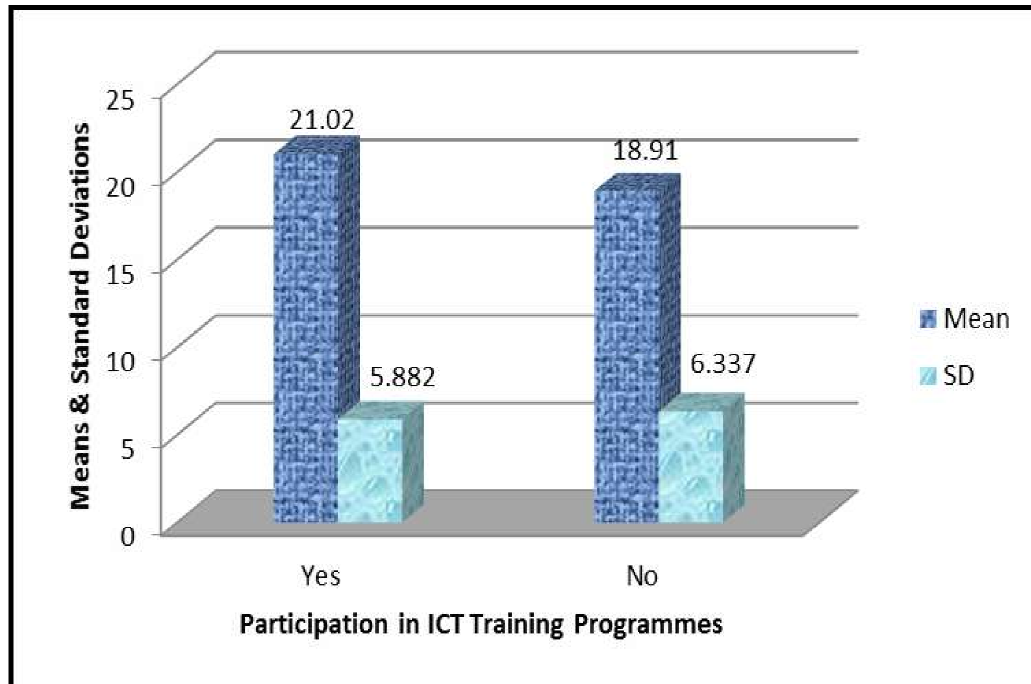


Figure 4.15: Column Chart showing Means and Standard Deviations of the ICT Knowledge Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Participation in ICT Training Programmes

Hypothesis: 24 ($H_0$24)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations.

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of different designations viz. Lecturer, Assistant Professor and Associate Professor working in the Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.25

Summary of ANOVA showing the Significance of Difference among the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	38740.909	2	19370.454	1.532*
Within Groups	8396687.295	665	12645.613	

*Not significant at 0.05 level

From Table 4.25, it is evident that the F-value (1.532) is not significant at 0.05 level with df (2,665). It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their designations do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations"* is NOT REJECTED.

For a better understanding, the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their designations are presented in the following table:

Table 4.25(a)

Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations

Designations	N	Mean
Lecturer	81	208.81
Assistant Professor	452	230.28
Associate Professor	134	218.89

Table 4.25(a) presents the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their designations. It indicates that the mean ICT Skills scores of the teachers of Lecturer, Assistant Professor and Associate Professor cadre are 208.81, 230.28 and 218.89 respectively. On the basis of the above analysis, it is concluded that the Assistant Professor cadre teachers are slightly better in their ICT Skills than their counterparts.

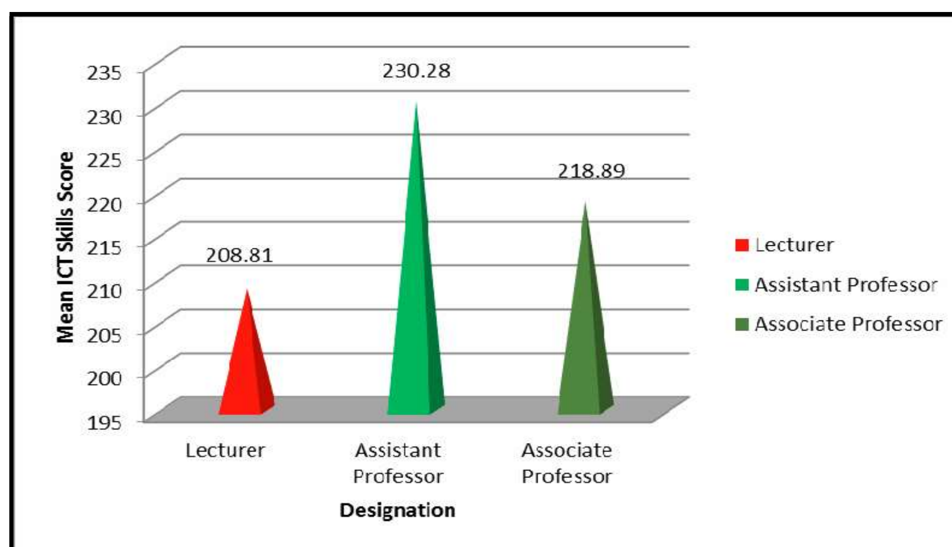


Figure 4.16: Cone Chart showing the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations

Hypothesis: 25 ($H_0$25)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Sex.

In order to find out whether there is a significant difference between the mean ICT Skills scores of the male and female teachers of Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.26

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Sex

Variable	Sex	N	Mean	SD	't'
ICT Skills	Male	290	225.04	117.046	0.069*
	Female	377	225.65	109.108	

* Not significant at 0.05 level

From Table 4.26 it is evident that the t-value (0.069) is not significant at 0.05 level with df = 665. It indicates that the mean ICT Skills scores of the male and female teachers of Arts and Science Colleges of Bharathidasan University region do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Sex",* is NOT REJECTED.

Further, it can be seen that the mean ICT Skills score of the female teachers (225.65) is slightly higher than that of the male teachers (225.04). It is therefore concluded that the female teachers of Arts and Science Colleges of Bharathidasan University region are slightly better in their ICT Skills than the male teachers of Arts and Science Colleges of Bharathidasan University region.

Hypothesis: 26 ($H_0$26)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age.

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region belonging to different age groups viz. 24-34, 35-45 and 46-56, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.27

Summary of ANOVA showing the Significance of Difference among the mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age

Sources of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	91317.570	2	45658.785	3.633*
Within Groups	8344110.634	665	12566.432	

*Significant at 0.05 level

From Table 4.27 it is evident that the F-value (3.633) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their age differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age"* is REJECTED.

As significant difference is found among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their age, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.27(a)

Duncan's Post Hoc Analysis of the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age

Age	N	Subset for Alpha = 0.05	
		1	2
46-56	157	206.16	
35-45	249	225.68	225.68
24-34	261		236.67

Table 4.27(a) shows that the mean ICT Skills scores, 206.16 and 225.68 are located in subset 1 and 236.67 is located in subset 2 at 0.05 level. It is understood that there is significant difference in the mean ICT Skills scores of the teachers of the age group 35-45 and 46-56. Significant difference is noted between the mean scores of the teachers of the above two categories and the teachers of 24-34 age group. Among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region of 24-34, 35-45 and 46-56 age group viz., 236.67, 225.38 and 206.16, the mean ICT Skills scores of the teachers of 24-34 age group is higher than that of their counterparts. It is therefore concluded that the teachers of 24-34 age group are better in their ICT Skills than the teachers of 35-45 and 46-56 age groups.

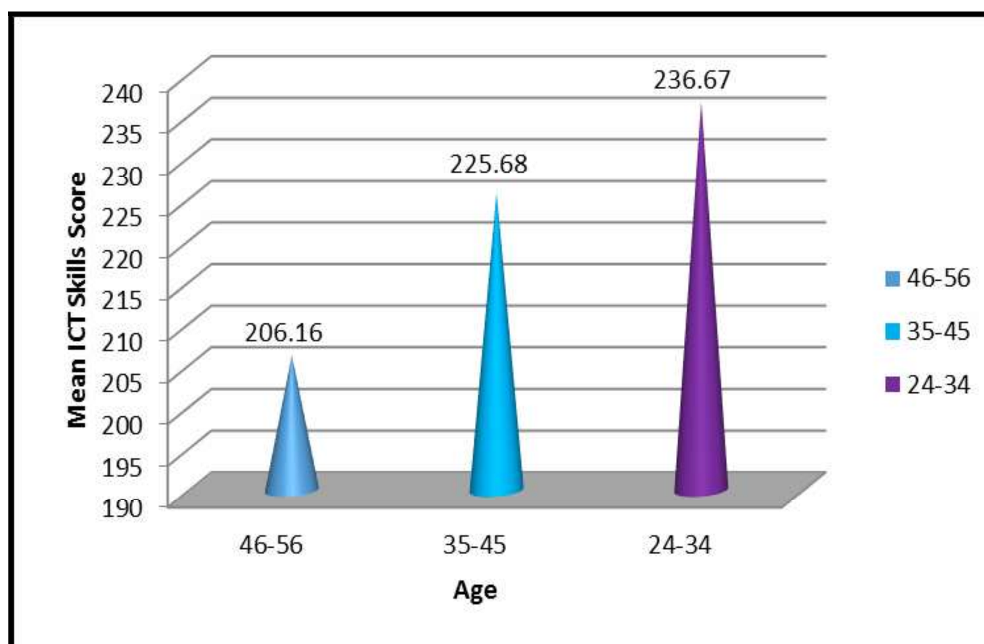


Figure 4.17: Cone Chart showing the mean ICT Skills Scores of the Teachers of the Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age

Hypothesis: 27 ($H_0$27)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different academic qualifications (viz., M.A., M.Sc., M.Com. and M.B.A.), the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.28

Summary of ANOVA showing the Significance of Difference among the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	684460.041	2	342230.021	29.318*
Within Groups	7750968.163	665	11673.145	

*Significant at 0.05 level

From Table 4.28 it is evident that the F-value (29.318) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their academic qualifications differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications"* is REJECTED.

As significant difference is found among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their academic qualifications, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.28(a)

Duncan's Post Hoc Analysis of the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

Academic Qualifications	N	Subset for Alpha = 0.05	
		1	2
M.A.	215	178.94	
M.Com.& M.B.A.	141		247.36
M.Sc.	311		247.53

Table 4.28(a) shows that the mean ICT Skills scores 178.94 is located in subset 1 whereas 247.36 and 247.53 are located in subset 2 at 0.05 level. It is understood that there is no significant difference in the mean ICT Skills scores of the teachers with M.Com. & M.B.A. and with M.Sc. degrees. On the other hand, significant difference has been found in the mean ICT Skills scores of the teachers of the above two groups and the scores of the teachers with M.A. degree.

From the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing M.A., M.Com. & M.B.A. and M.Sc. degrees viz., 178.94, 247.36 and 247.53 respectively, the mean ICT Skills scores of the teachers with M.Sc. degree is higher than that of their counterparts. It is therefore concluded that the teachers with M.Sc. degree are better in their ICT Skills than the teachers with M.A., M.Com. & M.B.A. degrees.

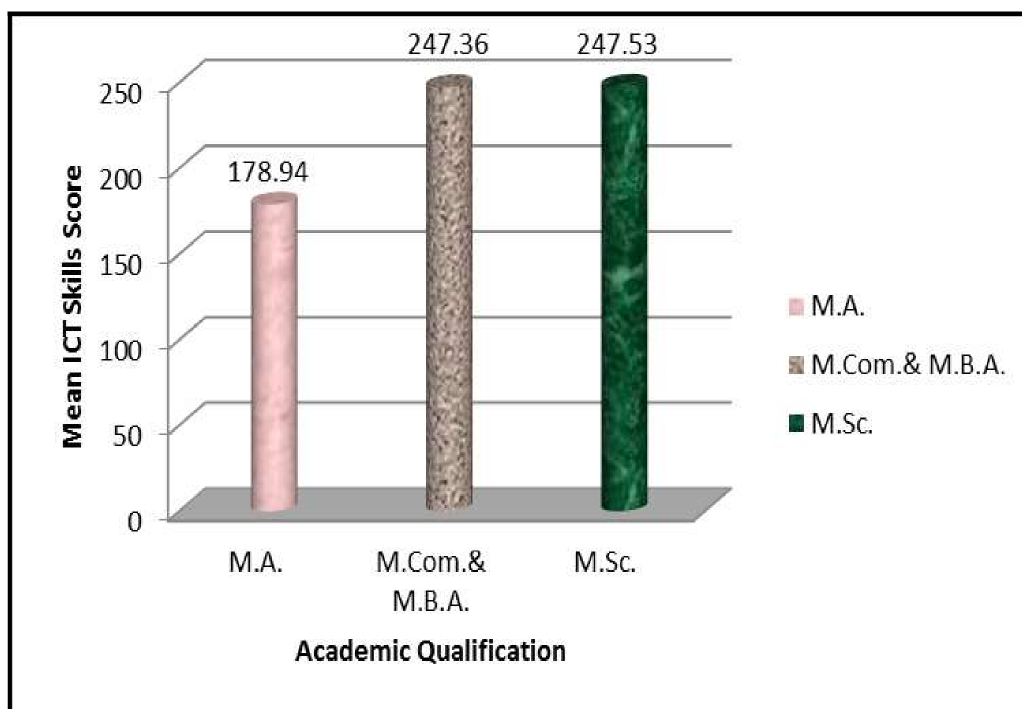


Figure 4.18: Cylinder Chart showing the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

Hypothesis 28 ($H_0$28)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications.

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different professional qualifications viz. B.Ed., M.Ed., other degree and none, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.29

Summary of ANOVA showing the Significance of Difference among the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	273372.378	3	91124.126	7.402*
Within Groups	8162055.825	664	12310.793	

*Significant at 0.05 level

From Table 4.29 it is evident that the F-value (7.402) is significant at 0.05 level with df (3,664). It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications"* is REJECTED.

As significant difference is found among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their professional qualifications, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.29(a)

Duncan's Post Hoc Analysis of the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications

Professional Qualifications	N	Subset for Alpha = 0.05	
		1	2
None	399	190.83	
B.Ed.	194	200.39	200.39
M.Ed.	46		238.36
Any other	28		240.61

Table 4.29(a) shows that the mean ICT Skills scores 190.83 and 200.39 are located in subset 1 whereas 200.39, 238.36 and 240.61 are located in subset 2 at 0.05 level. It is understood that there is significant difference in the mean ICT Skills scores of the teachers with no professional degrees and teachers with B.Ed. degree. Significant difference is observed in the mean ICT Skills scores of the teachers of the above two categories and the scores of the teachers with M.Ed. degree. Similarly, significant difference has been found in the mean ICT Skills scores of the teachers of the above three categories and the mean scores of the teachers with other degrees viz. PGDCA, MCA etc.

The mean ICT Skills Scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing no professional degree, B.Ed., M.Ed., and other degrees viz. PGDCA, MCA etc., are 190.83, 200.39, 238.36 and 240.61 respectively. The mean ICT Skills scores of the teachers with other degree, is higher than that of their counterparts. It is therefore concluded that the teachers with other degrees viz. PGDCA, MCA etc., are better in their ICT Skills than the teachers with B.Ed., M.Ed. degrees as well as the teachers with no professional degree.

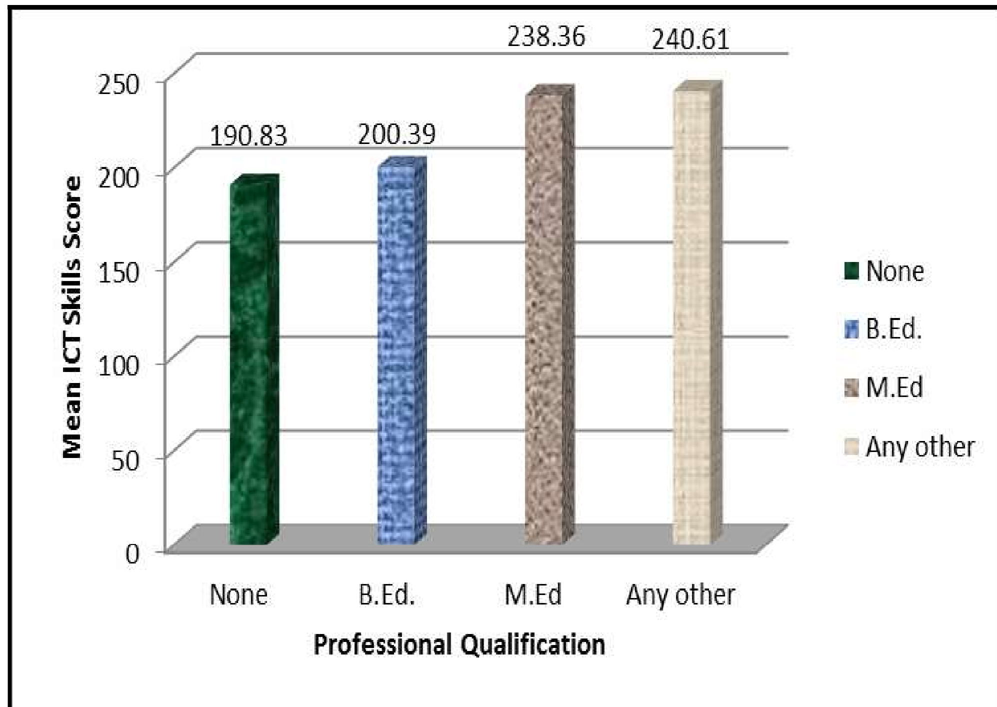


Figure 4.19: Column Chart showing the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications

Hypothesis: 29 ($H_0$29)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications.

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different research qualifications viz. M.Phil., Ph.D., both M.Phil. and Ph.D. and teachers with no such degrees, above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.30

Summary of ANOVA showing the Significance of Difference among the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	42224.969	3	14074.990	1.112*
Within Groups	8393203.235	664	12659.432	

*Not Significant at 0.05 level

From Table 4.30, it is evident that the F-value (1.112) is not significant at 0.05 level with df (3,664). It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the research qualifications do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications"* is NOT REJECTED.

For a better understanding, the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their research qualifications are presented in the following table:

Table 4.30(a)

Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications

Research Qualifications	N	Mean
None	37	211.68
M.Phil.	351	221.71
Ph.D.	131	224.08
Both M.Phil. and Ph.D.	148	240.59

Table 4.30(a) presents the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their research qualifications. The mean ICT Skills scores of the teachers with no research degree, M.Phil., Ph.D., both M.Phil. and Ph.D. are 211.68, 221.71, 224.08 and 240.59 respectively. The mean ICT Skills Score of the teachers with both M.Phil. and Ph.D. degrees (240.59) is higher than that of the teachers with M.Phil., Ph.D. and teachers with no such degrees. Hence, it may be concluded that teachers with both M.Phil. and Ph.D. degrees are better in their ICT Skills than their counterparts.

Hypothesis: 30 ($H_0$30)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution, in which they are employed.

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region working at different categories of colleges viz. Government, Government-Aided and Self-Financing, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.31

Summary of ANOVA showing the Significance of Difference among the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	59747.446	2	29873.723	2.368*
Within Groups	8375680.758	665	12613.977	

*Significant at 0.05 level

From Table 4.31, it is evident that the F-value (2.368) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the category of institution differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution, in which they are employed"* is REJECTED.

As significant difference is found among the mean ICT Knowledge scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the category of the institution Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.31(a)

Duncan's Post Hoc Analysis of the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution

Category of the Institution	N	Subset for Alpha = 0.05	
		1	2
Self-financing	302	219.03	
Government	208	221.84	221.84
Government-Aided	157		242.31

Table 4.31(a) shows that the mean ICT Skills scores, 219.03 and 221.84 are located in subset 1 whereas 221.84 and 242.31 are located in subset 2 at 0.05 level. It is understood that, there is slight difference in the mean ICT Skills scores of the teachers working in Government and Self-financing colleges, whereas significant difference has been found in the mean ICT Skills scores of the teachers working in the above two category colleges and the teachers working in the Government-aided colleges.

The mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region working in Self-financing, Government and Government-aided colleges are 219.03, 221.84 and 242.31 respectively. The mean ICT Skills scores of the teachers working in Government-aided colleges is higher than that of their counterparts. It is therefore concluded that the teachers working in Government-aided colleges have better ICT Attitude than the teachers working in Government and Self-financing colleges.

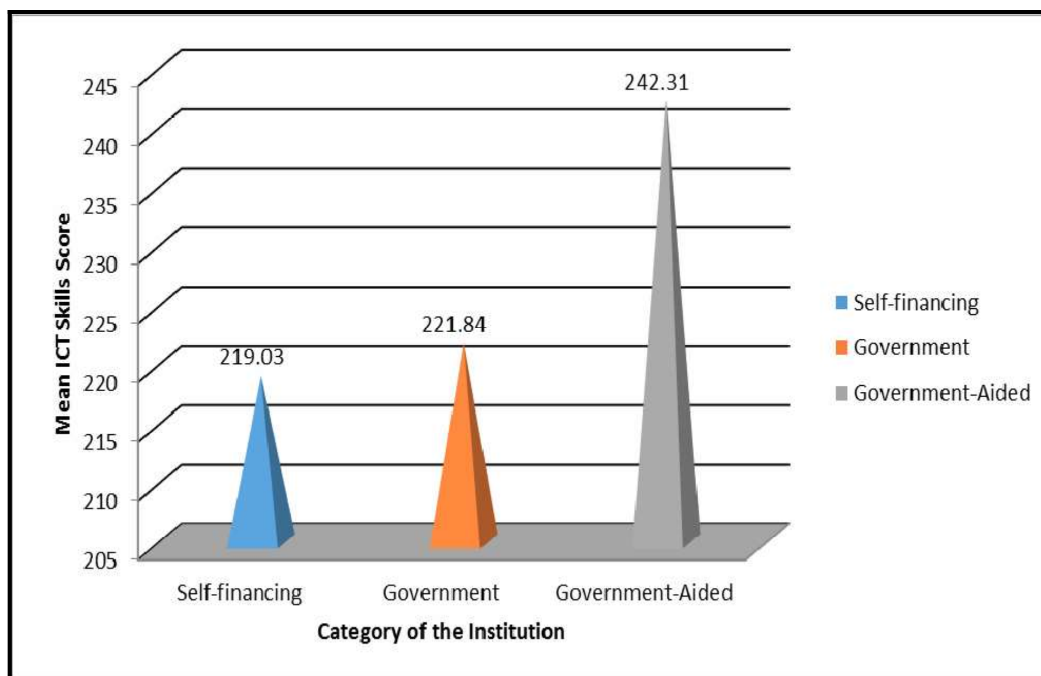


Figure 4.20: Cone Chart showing the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution

Hypothesis: 31 ($H_0$31)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution, in which they are employed.

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region working at different types of colleges, viz. Men, Women and Co-educational, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.32

Summary of ANOVA showing the Significance of Difference among the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	45846.435	2	22923.217	1.814*
Within Groups	8389581.769	665	12634.912	

*Not Significant at 0.05 level

From Table 4.32, it is evident that the F-value (1.814) is not significant at 0.05 level with df (2,665). It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the type of institution do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution, in which they are employed"* is NOT REJECTED.

For a better understanding, the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the type of institution are presented in the following table:

Table 4.32(a)

Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution

Type of Institution	N	Mean
Men	25	249.12
Women	237	233.58
Co-educational	405	219.13

Table 4.32(a) presents the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the type of institution. It indicates that the mean ICT Skills scores of the teachers of Men, Women and Co-Educational institutions are 249.12, 233.58 and 219.13 respectively.

The mean ICT Skills score of the teachers working in Men's Colleges (249.12), which is higher than that of the teachers working in Women's and Co-educational colleges. Hence, it is concluded that the teachers working in Men's college are better in their ICT Skills than their counterparts.

Hypothesis: 32 ($H_0$32)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution, in which they are employed.

In order to find out whether there is a significant difference between the mean ICT Skills scores of the teachers of Autonomous and Non-Autonomous Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and the 't' test was attempted to test the same.

Table 4.33

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution

Variable	Nature of Institution	N	Mean	SD	't'
ICT Skills	Autonomous	268	232.49	113.251	1.336*
	Non-Autonomous	399	220.62	111.953	

* Not-significant at 0.05 level

From Table 4.33, it is evident that the t-value (1.336) is not significant at 0.05 level with df = 665. It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution, in which they are employed"* is NOT REJECTED.

Further, it can be seen that the mean ICT Skills score of the teachers working in autonomous colleges (232.49) is slightly higher than that of the teachers belonging to non-autonomous colleges (220.62). It is therefore concluded that the teachers working in autonomous Arts and Science Colleges are slightly better in their ICT Skills than the teachers working in non-autonomous Arts and Science Colleges of Bharathidasan University region.

Hypothesis: 33 ($H_0$33)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Locality of the Institution, in which they are employed.

In order to find out, whether there is a significant difference between the mean ICT Skills scores of the teachers working in urban and rural Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and the 't' test was attempted to test the same.

Table 4.34

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Locality of the Institution

Variable	Locality of the Institution	N	Mean	SD	't'
ICT Skills	Urban	373	231.14	113.375	1.488*
	Rural	294	218.09	111.242	

* Not-Significant at 0.05 level

From Table 4.34, it is evident that the t-value (1.488) is not significant at 0.05 level with df = 665. It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Locality of the Institution, in which they are employed"* is NOT REJECTED.

Further, it can be seen that the mean ICT Skills score of the teachers working in urban colleges (231.14), which is higher than the mean score (218.09) of the teachers belonging to rural colleges. It is therefore concluded that the teachers working in urban Arts and Science Colleges are better in their ICT Skills than the teachers working in rural Arts and Science Colleges of Bharathidasan University region.

Hypothesis: 34 ($H_0$34)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home.

In order to find out whether there is a significant difference between the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who have and who do not have personal computer at home, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.35

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home

Variable	Availability of Personal Computer at Home	N	Mean	SD	't'
ICT Skills	Yes	531	236.75	112.240	5.253*
	No	136	181.03	102.648	

* Significant at 0.05 level

From Table 4.35, it is evident that the t-value (5.253), is significant at 0.05 level with df = 665. It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home"* is REJECTED.

Further, it can be seen that the mean ICT Skills score of the teachers who have personal computer at home (236.75) is higher than the mean score (181.03) of the teachers who do not have personal computers at home. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region who have personal computer at home are better in their ICT Skills than the teachers who do not possess personal computer at home.

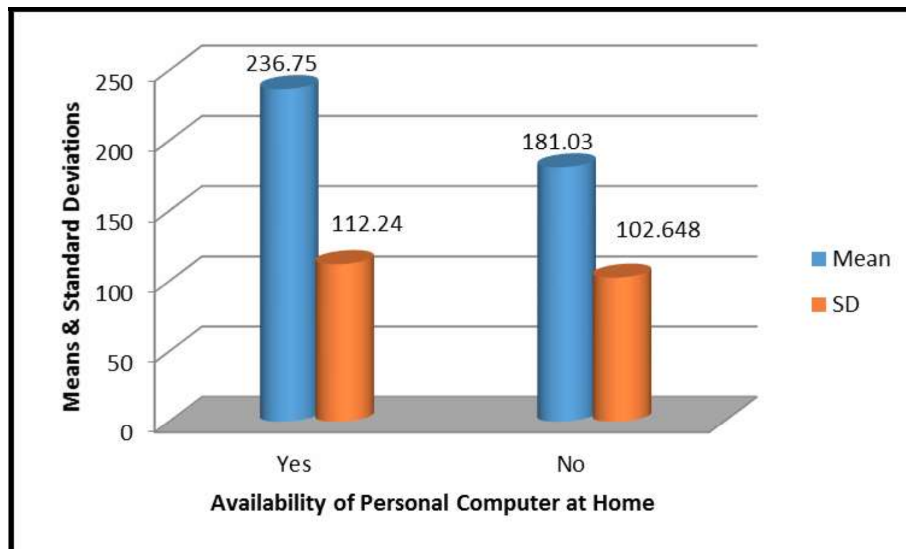


Figure 4.21: Cylinder Chart showing Means and Standard Deviations of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home

Hypothesis: 35 ($H_0$35)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home.

In order to find out whether there is a significant difference between the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who have and who do not have internet connectivity at home, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.36

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home

Variable	Availability of Internet Connectivity at Home	N	Mean	SD	't'
ICT Skills	Yes	451	236.96	112.650	3.877*
	No	216	201.23	108.659	

* Significant at 0.05 level

From Table 4.36, it is evident that the t-value (3.877) is significant at 0.05 level with df = 665. It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Connectivity at Home"* is REJECTED.

Further, it can be seen that the mean ICT Skills score of the teachers, who have internet connectivity at home (236.96) is higher than the mean score of the teachers who do not have internet connectivity at home (201.23). It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region who have internet connectivity at home are better in their ICT Skills, than the teachers who do not have the same.

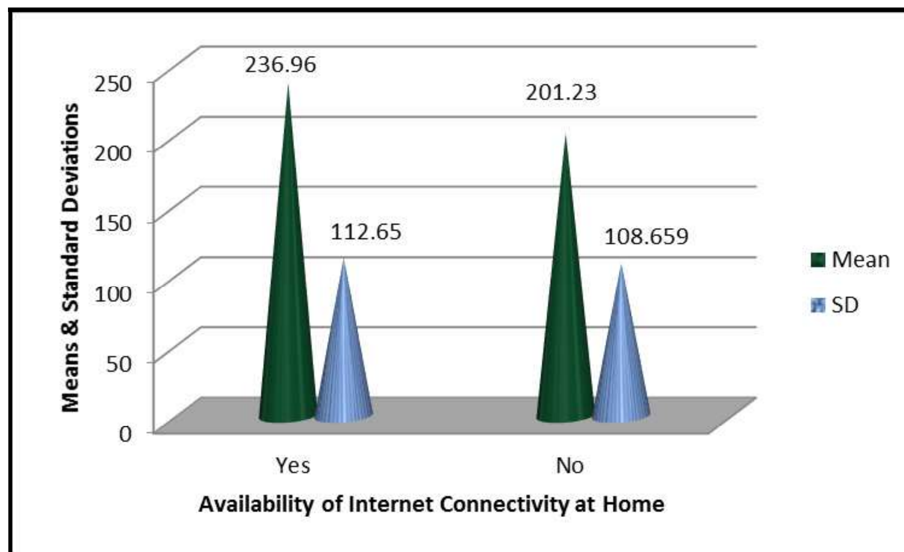


Figure 4.22: Cone Chart showing Means and Standard Deviations of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home

Hypothesis: 36 ($H_0$36)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile.

In order to find out whether there is a significant difference between the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of internet access on mobile, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.37

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile

Variable	Internet Access on Mobile	N	Mean	SD	't'
ICT Skills	Yes	442	243.57	111.491	5.999*
	No	225	189.67	106.078	

* Significant at 0.05 level

From Table 4.37, it is evident that the t-value (5.999) is significant at 0.05 level with df = 665. It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile"* is REJECTED.

Further, it can be seen that the mean ICT Skills score of the teachers, who have internet access on mobile (243.57) is higher than the mean score (189.67) of the teachers, who do not have internet access on mobile. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region, who have internet access on mobile are better in their ICT Skills than the teachers, who do not have internet access on mobile.

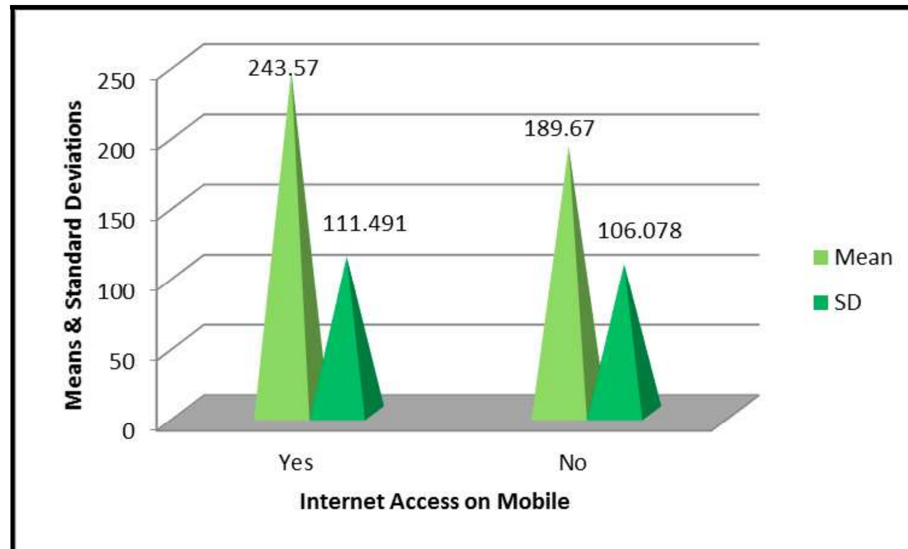


Figure 4.23: Cone Chart showing Means and Standard Deviations of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile

Hypothesis: 37 ($H_0$37)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer.

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, with different lengths of experience with computer viz. Less than 1 year, 1-2 years, 2-4 years, 4-6 years and 6 years and above, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.38

Summary of ANOVA showing the Significance of Difference among the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	1783771.427	4	445942.857	44.382*
Within Groups	6651656.776	663	10047.820	

*Significant at 0.05 level

From Table 4.38, it is evident that the F-value (44.382) is significant at 0.05 level with df (4,663). It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of experience with computer differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer"* is REJECTED.

As significant difference is found among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of experience with computer, Duncan's Post Hoc Analysis was attempted to locate the significance of difference.

Table 4.38(a)

Duncan's Post Hoc Analysis of the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer

Length of Experience with Computer	N	Subset for Alpha = 0.05		
		1	2	3
Less than 1 year	53	129.94		
1-2 years	90	149.57		
2-4 years	112		199.19	
4-6 years	74		217.45	
6 years and above	338			270.96

Table 4.38(a) shows that the mean ICT Skills scores, 129.94 and 149.57 are located in subset 1 whereas 199.19 and 217.45 are located in subset 2 and 270.96 is located in subset 3 at 0.05 level. It is understood that there is a significant difference in the mean ICT Skills scores of the teachers with computer experience less than 1 year and mean ICT Skills scores of the teachers with 1-2 years of experience. Significant difference has been found in the mean ICT Skills scores of the teachers of the above two groups and the mean scores of the teachers with 2-4 years of experience. There is a significant difference in the mean ICT Skills scores of the teachers of the above three groups and the mean scores of the teachers with 4-6 years of experience. Similarly, significant difference has been found in the mean ICT Skills scores of the teachers of the above four groups and the mean scores of the teachers with experience for a period of 6 years and above.

The mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing computer experience for less than 1 year, 1-2 years, 4-6 years and 6 years and above are 129.94, 149.57, 199.19, 217.45 and 270.96 respectively. The mean ICT Skills scores of the

teachers with experience for 6 years and above, is higher than that of their counterparts. It is therefore concluded that the teachers with experience for 6 years and above are better in their ICT Skills than the teachers with lower computer experience span.

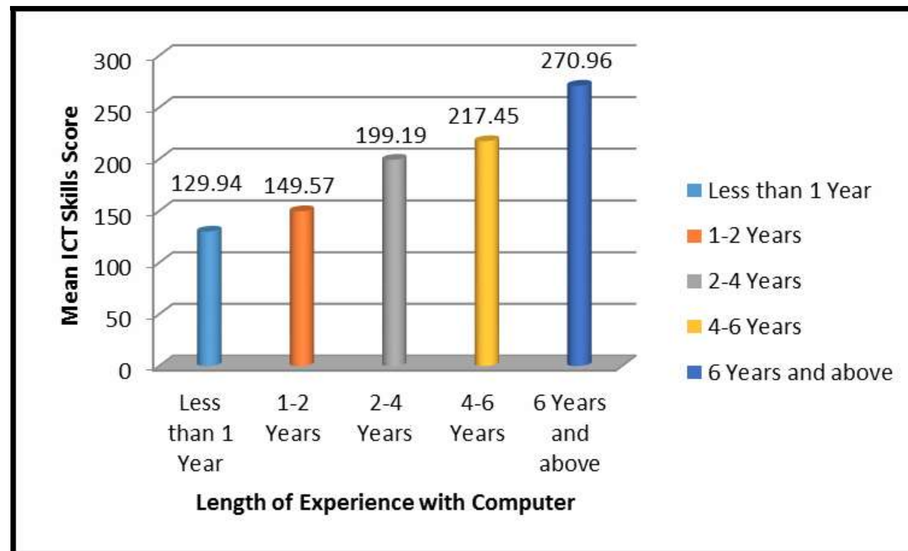


Figure 4.24: Cylinder Chart showing the mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer

Hypothesis: 38 ($H_0$38)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage.

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region with different frequency of computer usage viz. daily, on alternate days, once in a fortnight or so, once in a month or so and never, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.39

Summary of ANOVA showing the Significance of Difference among the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	1235615.172	4	308903.793	28.403*
Within Groups	7199813.032	663	10875.851	

*Significant at 0.05 level

From Table 4.39, it is evident that the F-value (28.403) is significant at 0.05 level with df (4,663). It indicates that, the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their frequency of computer usage differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage"* is REJECTED.

As significant difference is found among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their frequency of computer usage, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.39(a)

Duncan's Post Hoc Analysis of the mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage

Frequency of Computer Usage	N	Subset for Alpha = 0.05		
		1	2	3
Never	10	98.30		
Once in a month or so	42		148.98	
Once in a fortnight or so	76		176.54	
On alternate days	189		198.20	
Daily	350			263.48

Table 4.39(a) shows that the mean ICT Skills score 98.30 is located in subset 1 whereas 148.98, 176.54 and 198.20 are located in subset 2 and 263.48 is located in subset 3 at 0.05 level. It is understood that there is significant difference in the mean ICT Skills scores of the teachers, who never use the computer and who use the computer once in a month. Significant difference has been found in the mean ICT Skills scores of the teachers of the above two groups and the teachers using the computer once in a fortnight. Similarly, significant difference has been found in the mean ICT Skills scores of the teachers of the above three groups and the teachers using the computer on alternate days. There is a significant difference in the mean ICT Skills scores of the teachers of the above four groups and the mean ICT Skill scores of the teachers who use the computer daily.

From the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who use the computer never, once in a month or so, once in a fortnight or so, on alternate days and daily viz. 98.30, 148.98, 176.54, 198.20 and 263.48 respectively, the mean ICT Skills scores of the teachers who use computer daily is higher than that of their

counterparts. It is therefore concluded that the teachers who use computers daily are better in their ICT Skills than the teachers of the remaining categories.

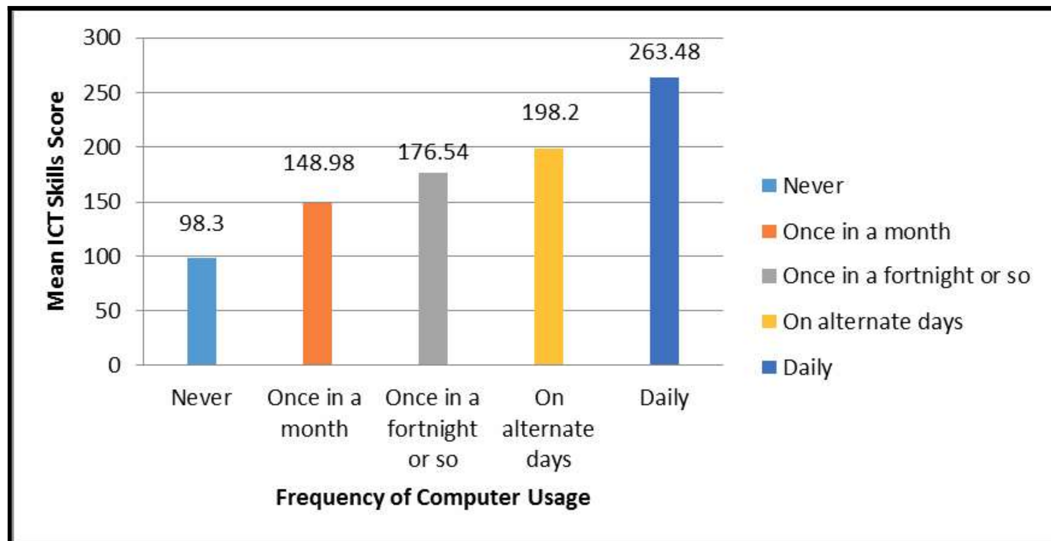


Figure 4.25: Column Chart showing mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage

Hypothesis: 39 ($H_0$39)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience.

In order to find out whether there is a significant difference among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different internet experience spans viz. less than 1 year, 1-2 years, 2-4 years, 4-6 years and 6 years and above, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.40

Summary of ANOVA showing the Significance of Difference among the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	2190802.834	4	547700.709	58.062*
Within Groups	6244625.370	663	9432.969	

*Significant at 0.05 level

From Table 4.40, it is evident that the F-value (58.062) is significant at 0.05 level with df (4,663). It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of internet experience differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience"* is REJECTED.

As significant difference is found among the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of internet experience, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.40(a)

Duncan's Post Hoc Analysis of the Mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of internet Experience

Length of Internet Experience	N	Subset for Alpha = 0.05				
		1	2	3	4	5
Less than 1 year	60	125.13				
1-2 years	116		160.69			
2-4 years	141			194.48		
4-6 years	84				254.32	
6 years and above	266					283.46

Table 4.40(a) shows that the mean ICT Skills score 125.13 is located in subset 1, 160.69 is located in subset 2, 194.48 is located in subset 3, 254.32 is located in subset 4 and 283.46 is located in subset 5 at 0.05 level. It is understood that there is significant difference in the mean ICT Skills scores of the teachers with internet experience of less than 1 year and teachers with 1-2 years of experience. Significant difference has been found in the mean ICT Skills scores of the teachers of the above two groups and the mean ICT Skills scores of the teachers with 2-4 years of experience.

There is a significant difference between the mean ICT Skills scores of the teachers of the above three groups and the mean ICT Skills scores of the teachers with 4-6 years of experience. Similarly, significant difference has been found in the mean ICT Skills scores of the teachers of the above four groups and the mean ICT Skills scores of the teachers with experience for 6 years and above.

The mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing internet experience for a period less than 1 year, 1-2 years, 4-6 years and 6 years and above are 125.13, 160.69, 194.48, 254.32 and 283.46 respectively. The mean ICT Skills scores of the

teachers with internet experience for 6 years and above is higher than that of their counterparts. It is therefore concluded that the teachers with internet experience for 6 years and above are better in their ICT Skills, than the teachers with lower internet experience span.

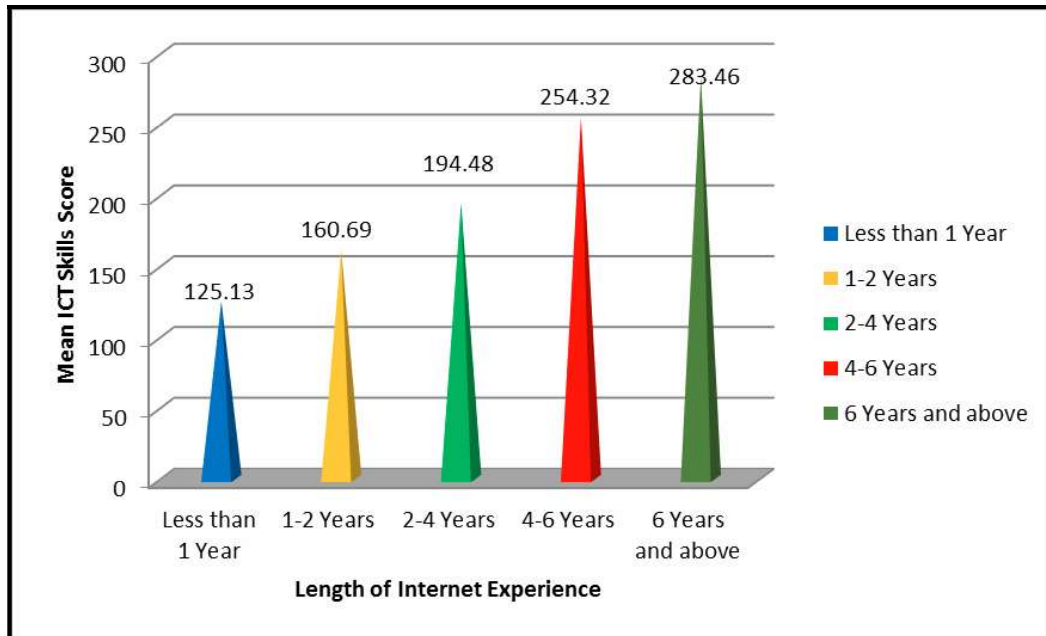


Figure 4.26: Cone Chart showing the mean ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience

Hypothesis: 40 ($H_0$40)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of ICT Devices in their Institution for Facilitating Learning.

In order to find out whether there is a significant difference between the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of availability of ICT devices in their institution for facilitating learning, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.41

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of ICT Devices in their Institution

Variable	Availability of ICT devices at Institution	N	Mean	SD	't'
ICT Skills	Yes	658	225.16	112.679	0.452*
	No	9	242.22	106.787	

* Not significant at 0.05 level

From Table 4.41, it is evident that the t-value (0.452) is not significant at 0.05 level with df = 665. It indicates that, the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of ICT Devices in their Institution for Facilitating Learning"* is NOT REJECTED.

Further, it can be seen that the mean ICT Skills score of the teachers who do not have ICT devices in their institution (242.22) is higher than the mean score (225.16) of the teachers who have ICT devices in their institution. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region who do not have ICT devices in their institution are slightly better in their ICT Skills than the teachers who have ICT devices in their institution for facilitating learning.

Hypothesis: 41 ($H_0$41)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges for Facilitating Learning.

In order to find out whether there is a significant difference between the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who have and who do not have computer access at college for facilitating learning, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.42

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges

Variable	Availability of Computer Access at College	N	Mean	SD	't'
ICT Skills	Yes	577	229.45	113.306	2.369*
	No	90	199.33	104.397	

* Significant at 0.05 level

From Table 4.42, it is evident that the t-value (2.369) is significant at 0.05 level with df = 665. It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges for Facilitating Learning"* is REJECTED.

Further, it can be seen that the mean ICT Skills score of the teachers who have computer access at college is 229.45 which is higher than the mean score (199.33) of the teachers who do not have the same. It is therefore concluded that, the teachers of Arts and Science Colleges of Bharathidasan University region who have computer access at college are slightly better in their ICT Skills, than the teachers who do not possess computer access at college.

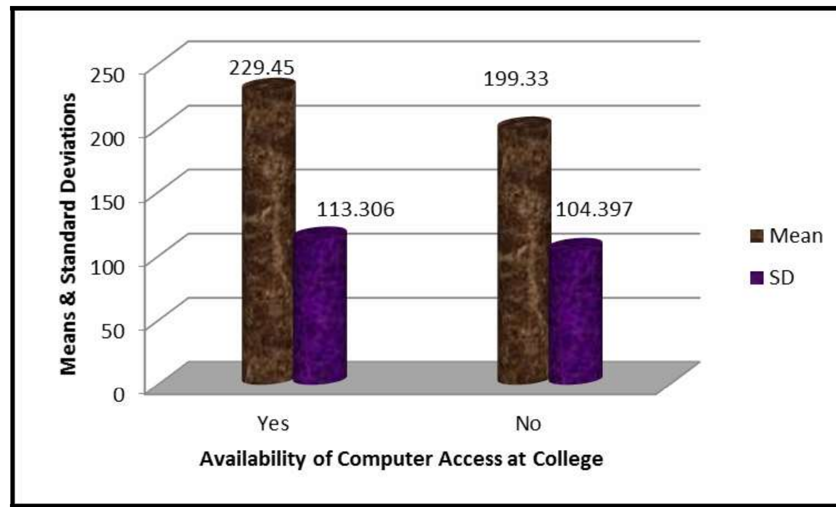


Figure 4.27: Cylinder Chart showing Means and Standard Deviations of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges

Hypothesis: 42 ($H_0$42)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges for Facilitating Learning.

In order to find out whether there is a significant difference between the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, with and without internet connectivity at their college, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.43

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges

Variable	Availability of Internet Connectivity at College	N	Mean	SD	't'
ICT Skills	Yes	505	231.58	113.956	2.519*
	No	162	206.08	106.052	

* Significant at 0.05 level

From Table 4.43, it is evident that the t-value (2.519) is significant at 0.05 level with df = 665. It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their colleges for Facilitating Learning"* is REJECTED.

Further, it can be seen that the mean ICT Skills score of the teachers who have internet connectivity at their colleges (231.58) is higher than the mean score (206.08) of the teachers who do not have internet connectivity at their colleges. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region who have internet connectivity at College are slightly better in their ICT Skills than the teachers who do not have such facility in their institution.

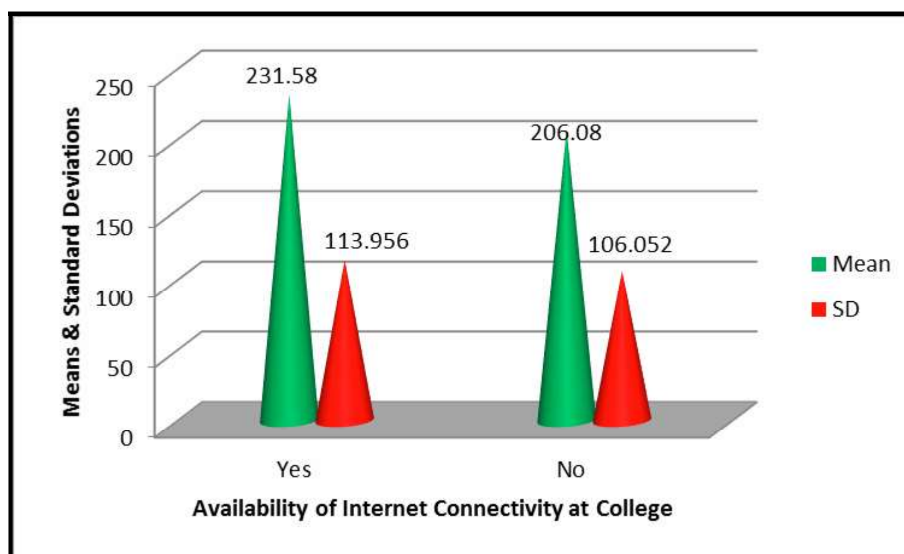


Figure 4.28: Cone Chart showing Means and Standard Deviations of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges

Hypothesis: 43 ($H_0$43)

There is no significant difference in the ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region sub-grouped on the basis of their Participation in ICT Training Programmes.

In order to find out whether there is a significant difference between the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who have and who have not undergone ICT training programmes, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.44

Means, Standard Deviations and t-value of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Participation in ICT Training programmes

Variable	Participation in ICT Training Programmes	N	Mean	SD	't'
ICT Skills	Yes	53	276.74	113.915	3.491*
	No	614	220.95	111.411	

* Significant at 0.05 level

From Table 4.44, it is evident that the t-value (3.491) is significant at 0.05 level with df = 665. It indicates that the mean ICT Skills scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Skills scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Participation in ICT Training Programmes"* is REJECTED.

Further, it can be seen that the mean ICT Skills score of the teachers who have undergone ICT training programmes (276.74) is higher than the mean score (220.95) of the teachers who have not undergone ICT training programmes. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region, who have undergone ICT training programmes are better in their ICT Skills than the teachers, who have not undergone ICT training programmes.

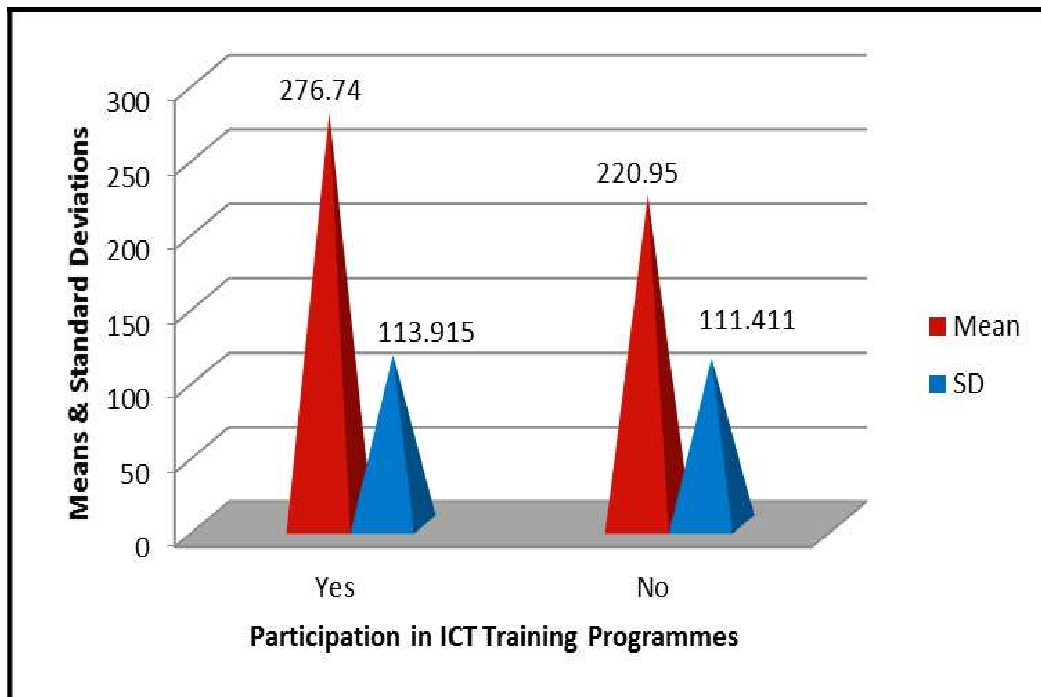


Figure 4.29: Cone Chart showing Means and Standard Deviations of the ICT Skills Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Participation in ICT Training Programmes

Hypothesis: 44 ($H_0$44)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of different designations viz. Lecturer, Assistant Professor and Associate Professor working in the Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.45

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	2780.191	2	1390.095	2.511*
Within Groups	367656.899	665	553.700	

*Significant at 0.05 level

From Table 4.45, it is evident that the F-value (2.511) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their designations differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations"* is REJECTED.

As significant difference is found among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their designations, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.45(a)

Duncan's Post Hoc Analysis of the mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations

Designations	N	Subset for Alpha = 0.05	
		1	2
Lecturer	81	116.35	
Assistant Professor	452		122.41
Associate Professor	134		123.02

Table 4.45(a) shows that the mean ICT Attitude scores, 116.35 is located in subset 1 whereas 122.41 and 123.02 are located in subset 2 at 0.05 level. It is understood that, there is a significant difference in the mean ICT Attitude scores of the teachers of Lecturer, Assistant Professor and Associate Professor categories.

Among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region of Lecturer, Assistant Professor and Associate Professor categories, the mean ICT Attitude scores of the teachers of Associate Professor category is higher than that of their counterparts. It is therefore concluded that the teachers of Associate Professor category are better than the teachers of Assistant Professor and Lecturer cadre in their ICT Attitude.

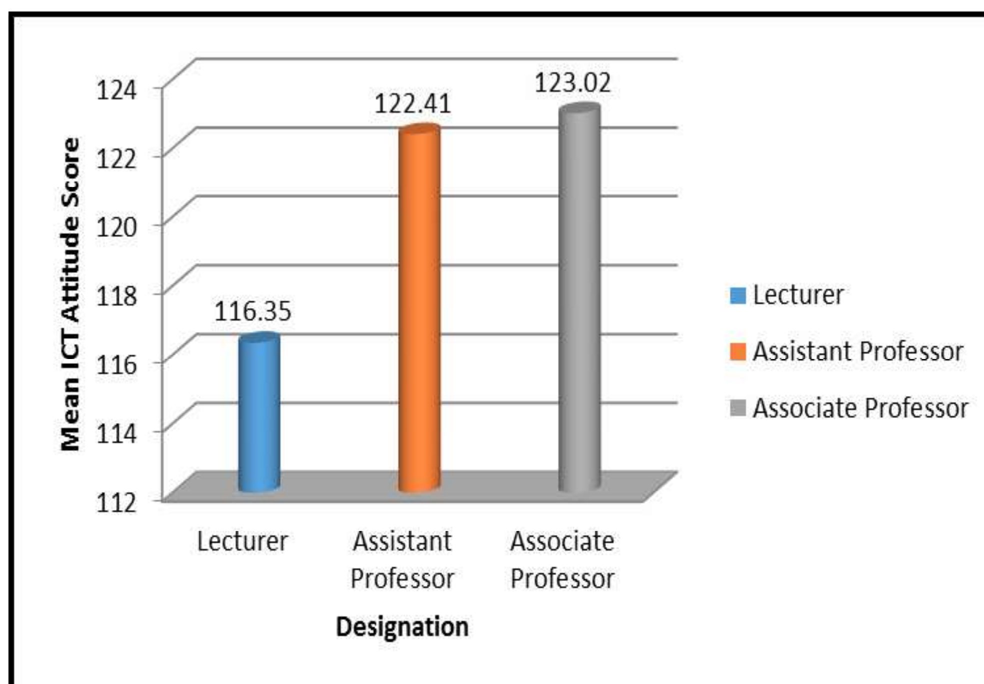


Figure 4.30: Cylinder Chart showing the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Designations

Hypothesis: 45 ($H_0$45)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region sub-grouped on the basis of Sex.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the male and female teachers of Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.46

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Sex

Variable	Sex	N	Mean	SD	't'
ICT Attitude	Male	290	121.60	23.678	0.194*
	Female	377	121.95	23.542	

* Not significant at 0.05 level

From Table 4.46 it is evident that the t-value (0.194) is not significant at 0.05 level with df = 665. It indicates that, the mean ICT Attitude scores of the male and female teachers of Arts and Science Colleges of Bharathidasan University region do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region sub-grouped on the basis of Sex"* is NOT REJECTED.

Further, it can be seen that the mean ICT Attitude score of the female teachers (121.95) is slightly higher than that of the male teachers (121.60). It is therefore concluded that the female teachers of Arts and Science Colleges of Bharathidasan University region are slightly better in their ICT Attitude than the male teachers of Arts and Science Colleges of Bharathidasan University region.

Hypothesis: 46 ($H_0$46)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of

Bharathidasan University region belonging to different age groups viz., 24-34, 35-45 and 46-56, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.47

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	158.892	2	79.446	0.142*
Within Groups	370278.188	665	557.648	

*Not significant at 0.05 level

From Table 4.47 it is evident that F-value (0.142) is not significant at 0.05 level with df (2,665). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their age do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age"* is NOT REJECTED.

For a better understanding, the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their age are presented in the following table:

Table 4.47(a)

Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Age

Age	N	Mean
24-34	261	121.84
35-45	249	122.27
46-56	157	120.99

Table 4.47(a) presents the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their age. The mean ICT Attitude scores of the teachers of 24-34, 35-45 and 46-56 age groups are 121.84, 122.27 and 120.99 respectively. The mean ICT Attitude score of the teachers of 35-45 age group (122.27) is higher than that of the teachers of remaining age groups. Hence, it may be concluded that teachers of 35-45 age group are better in their ICT Attitude than their counterparts.

Hypothesis: 47 ($H_0$47)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different academic qualifications viz., M.A., M.Sc., M.Com. and M.B.A. the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.48

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	13227.882	2	6613.941	12.294*
Within Groups	357209.198	665	537.966	

*Significant at 0.05 level

From Table 4.48 it is evident that F-value (12.294) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their academic qualifications differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications"* is REJECTED.

As significant difference is found among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their academic qualifications, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.48(a)

Duncan's Post Hoc Analysis of the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

Academic Qualifications	N	Subset for Alpha = 0.05	
		1	2
M.A.	215	115.47	
M.Com.& M.B.A.	141		123.22
M.Sc.	311		125.53

Table 4.48(a) shows that the mean ICT Attitude scores, 115.47 is located in subset 1 whereas 123.22 and 125.53 are located in subset 2 at 0.05 level. It is understood that significant difference has been found in the mean ICT Attitude scores of the teachers with M.A., M.Com & M.B.A. as well as with M.Sc. degrees.

The mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing M.A., M.Com. & M.B.A. and M.Sc. degrees are 115.47, 123.22 and 125.53 respectively. The mean ICT Attitude scores of the teachers with M.Sc. degree is higher than that of their counterparts. It is therefore concluded that the teachers with M.Sc. qualification are better in their ICT Attitude than the teachers with M.A., M.Com. & M.B.A. degrees.

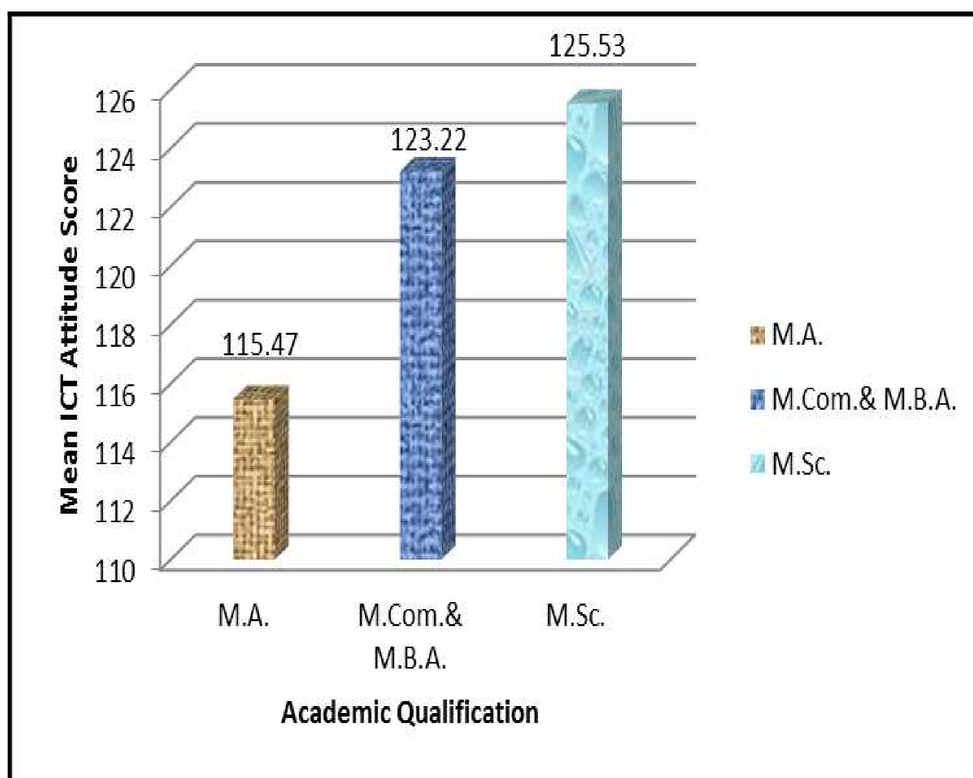


Figure 4.31: Column Chart showing the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Academic Qualifications

Hypothesis: 48 ($H_0$48)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different professional qualifications viz. B.Ed., M.Ed., any other degree (PGDCA, MCA etc.,) and none, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.49

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	13886.827	3	4628.942	8.607*
Within Groups	356550.252	664	537.783	

*Significant at 0.05 level

From Table 4.49, it is evident that F-value (8.607) is significant at 0.05 level with df (3,664). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their professional qualifications differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications"* is REJECTED.

As significant difference is found among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their professional qualifications, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.49(a)

Duncan's Post Hoc Analysis of the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications

Professional Qualifications	N	Subset for Alpha = 0.05		
		1	2	3
None	399	111.04		
B.Ed.	194	117.25	117.25	
M.Ed.	46		124.90	124.90
Any other	28			126.86

Table 4.49(a) shows that the mean ICT Attitude scores, 111.04 and 117.25 are located in subset 1, 117.25 and 124.90 are located in subset 2 whereas 124.90 and 126.86 are located in subset 3 at 0.05 level. It is understood that there is significant difference in the mean ICT Attitude scores of the teachers with no professional degree and the scores of the teachers with B.Ed. degree. Significant difference has been found in the mean ICT Attitude scores of the teachers of the above two groups and the scores of the teachers with M.Ed. degree. Further significant difference has been noticed between the mean ICT Attitude scores of the teachers of above three groups and the mean ICT Attitude scores of the teachers with other degrees viz. PGDCA, MCA etc.

The mean ICT Attitude Scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing no professional degree, B.Ed., M.Ed., and other degrees viz., PGDCA, MCA etc., are 111.04, 117.25, 124.90 and 126.86 respectively. The mean ICT Attitude Scores of the teachers with other degrees viz. PGDCA, MCA etc., is higher than that of their counterparts.

It is therefore concluded that the teachers with other degrees viz. PGDCA, MCA etc., are better in their ICT Attitude while compared with the teachers possessing M.Ed., B.Ed. degrees and the teachers with no such degrees.

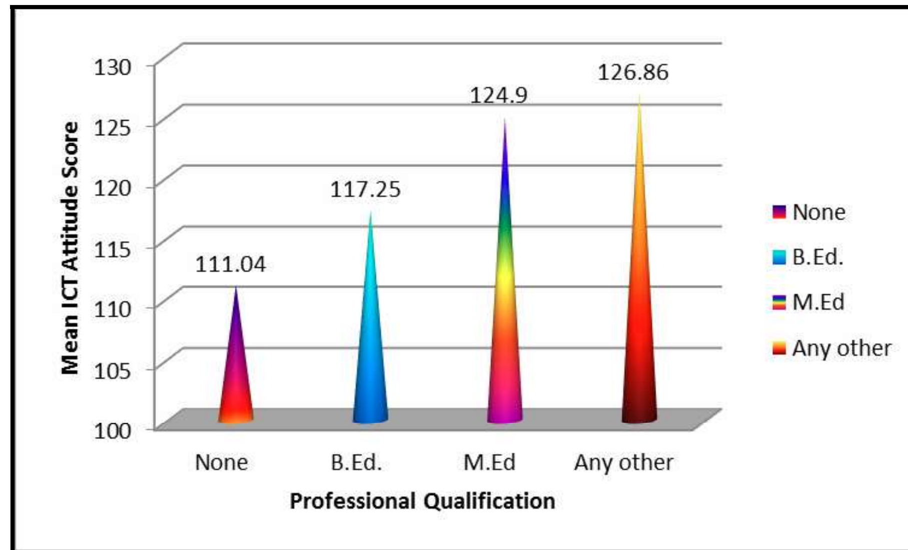


Figure 4.32: Cone Chart showing the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Professional Qualifications

Hypothesis: 49 ($H_0$49)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing different research qualifications, viz., M.Phil., Ph.D., both M.Phil. and Ph.D. and teachers with no such degrees, above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.50

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	9772.280	3	3257.427	5.988*
Within Groups	360664.799	664	543.989	

*Significant at 0.05 level

From Table 4.50, it is evident that F-value (5.988) is significant at 0.05 level with df (3,664). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the research qualifications differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications"* is REJECTED.

As significant difference is found among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their research qualifications, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.50(a)

Duncan's Post Hoc Analysis of the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications

Research Qualifications	N	Subset for Alpha = 0.05	
		1	2
None	37	117.68	
M.Phil.	351	118.66	
Ph.D.	131		125.97
Both M.Phil. and Ph.D.	148		126.67

Table 4.50(a) shows that, the mean ICT Attitude scores, 117.68 and 118.66 are located in subset 1 whereas 125.97 and 126.67 are located in subset 2 at 0.05 level. It is understood that significant difference has been found in the mean ICT Attitude scores of the teachers with no research qualification and the mean ICT Attitude scores of the teachers with M.Phil. Significant difference has been noticed in the mean ICT Attitude scores of the teachers of the above two groups and the scores of the teachers with Ph.D. Similarly significant difference has been noticed in the mean ICT Attitude scores of the teachers of the above three groups and the mean ICT Attitude scores of the teachers with both M.Phil. and Ph.D. degrees.

The mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing no research degree, M.Phil., Ph.D. and both M.Phil. and Ph.D. degrees are 117.68, 118.66, 125.97 and 126.67 respectively. The mean ICT Attitude scores of the teachers with both M.Phil. and Ph.D. degrees is higher than that of their counterparts. It is therefore concluded that the teachers with both M.Phil. and Ph.D. degrees have better ICT Attitude than their counterparts.

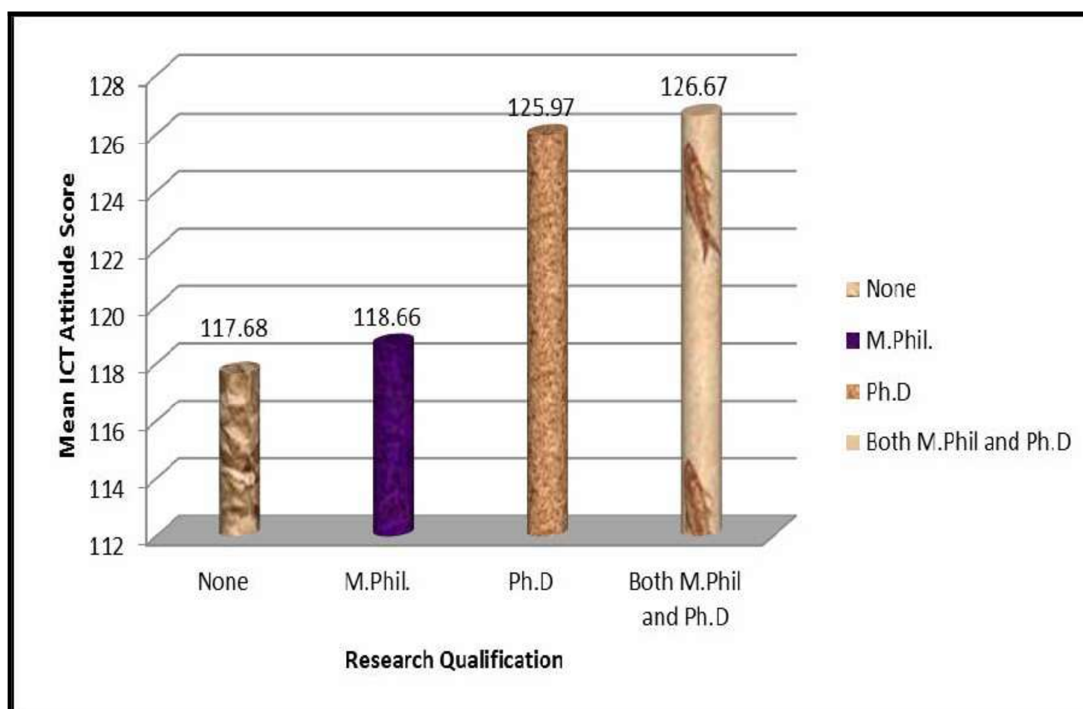


Figure 4.33: Cylinder Chart showing the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Research Qualifications

Hypothesis: 50 ($H_0$50)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution, in which they are employed.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, working at different categories of the colleges, viz. Government, Government-aided and Self-financing, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.51

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	12237.285	2	6118.643	11.342*
Within Groups	358199.794	665	539.458	

*Significant at 0.05 level

From Table 4.51, it is evident that the F-value (11.342) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the category of the institution differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution, in which they are employed"* is REJECTED.

As significant difference is found among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the category of the institution, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.51(a)

Duncan's Post Hoc Analysis of the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution

Category of the Institution	N	Subset for Alpha = 0.05		
		1	2	3
Self-financing	302	117.77		
Government	208		122.53	
Government-Aided	157			128.58

Table 4.51(a) shows that among the mean ICT Attitude scores, 117.77 is located in subset 1, 122.52 is located in subset 2 and 128.58 is located in subset 3 at 0.05 level. It is understood that there is significant difference in the mean ICT Attitude scores of the teachers working in Self-financing, Government and Government-aided colleges.

The mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region working in self-financing, government and government-aided colleges are 117.77, 122.53 and 128.58 respectively. The mean ICT Attitude scores of the teachers working in government-aided colleges is higher than that of their counterparts. It is therefore concluded that the teachers working in government-aided colleges are better in their ICT Attitude than the teachers working in government and self-financing colleges.

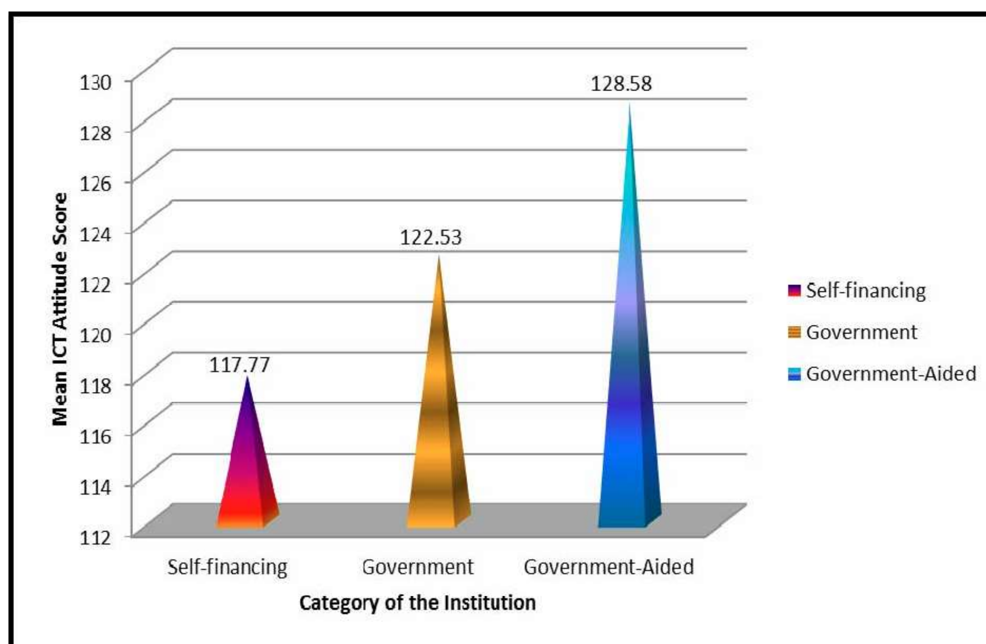


Figure 4.34: Cone Chart showing the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Category of the Institution

Hypothesis: 51 ($H_0$51)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution, in which they are employed.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region working at different types of the colleges, viz. men, women and co-educational, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.52

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	4659.583	2	2329.792	4.229*
Within Groups	365777.496	665	550.870	

*Significant at 0.05 level

From Table 4.52, it is evident that F-value (4.229) is significant at 0.05 level with df (2,665). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the type of institution differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution, in which they are employed"* is REJECTED.

As significant difference is found among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the type of institution, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.52(a)

Duncan's Post Hoc Analysis of the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution

Type of Institution	N	Subset for Alpha = 0.05	
		1	2
Co-educational	405	120.75	
Women	237	122.22	
Men	25		134.72

Table 4.52(a) shows that the mean ICT Attitude scores, 120.75 and 122.22 are located in subset 1, whereas 134.72 is located in subset 2 at 0.05 level. It is understood that there is significant difference in the mean ICT Attitude scores of the teachers working in co-educational, women and men colleges.

The mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region working in co-educational, women and men colleges are 120.75, 122.22 and 134.72 respectively. The mean ICT Attitude Scores of the teachers working in colleges for men is higher than that of their counterparts. It is therefore concluded that, the teachers working in Men's colleges are better in their ICT Attitude than the teachers working in women and co-educational colleges.

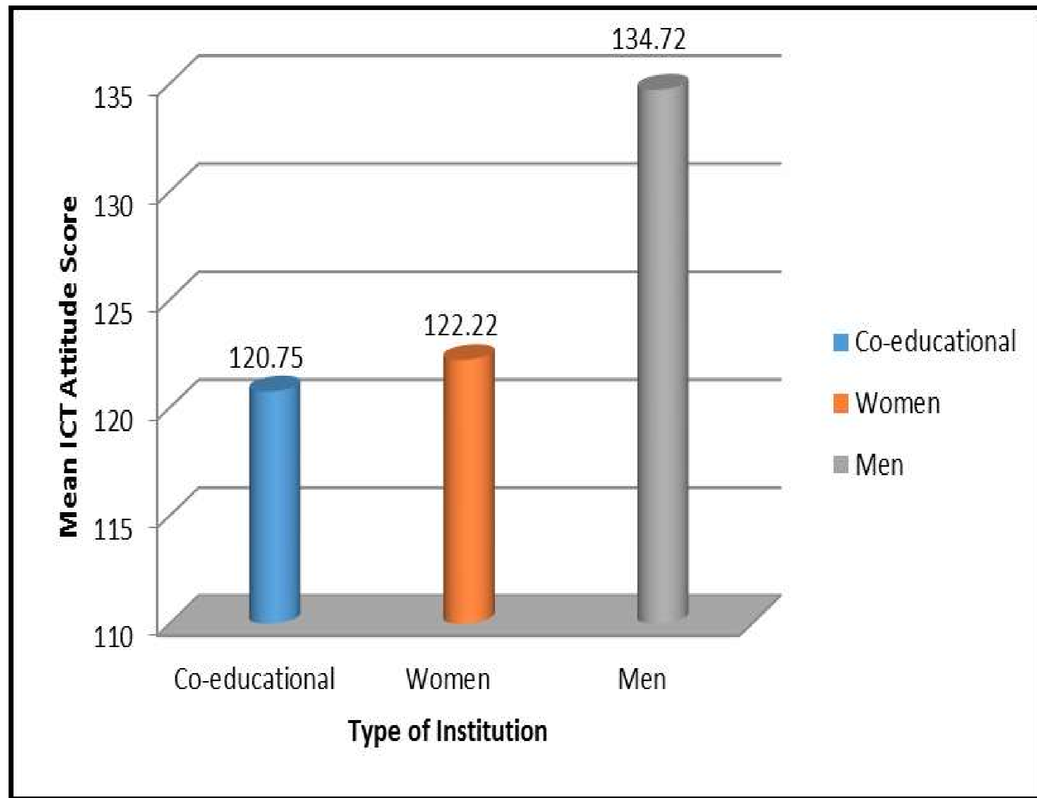


Figure 4.35: Cylinder Chart showing the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Type of Institution

Hypothesis: 52 ($H_0$52)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution, in which they are employed.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the teachers of autonomous and non-autonomous Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.53

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Nature of Institution

Variable	Nature of Institution	N	Mean	SD	't'
ICT Attitude	Autonomous	268	126.00	22.991	3.812*
	Non-Autonomous	399	118.97	23.585	

* Significant at 0.05 level

From Table 4.53, it is evident that t-value (3.812) is significant at 0.05 level with df = 665. It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution, in which they are employed"* is REJECTED.

Further, it can be seen that the mean ICT Attitude score of the teachers working in autonomous colleges is 126.00, which is slightly higher than that of the teachers belonging to non-autonomous colleges (118.97). It is therefore concluded that the teachers working in autonomous Arts and Science Colleges are slightly better in their ICT Attitude than the teachers working in non-autonomous Arts and Science Colleges of Bharathidasan University region.

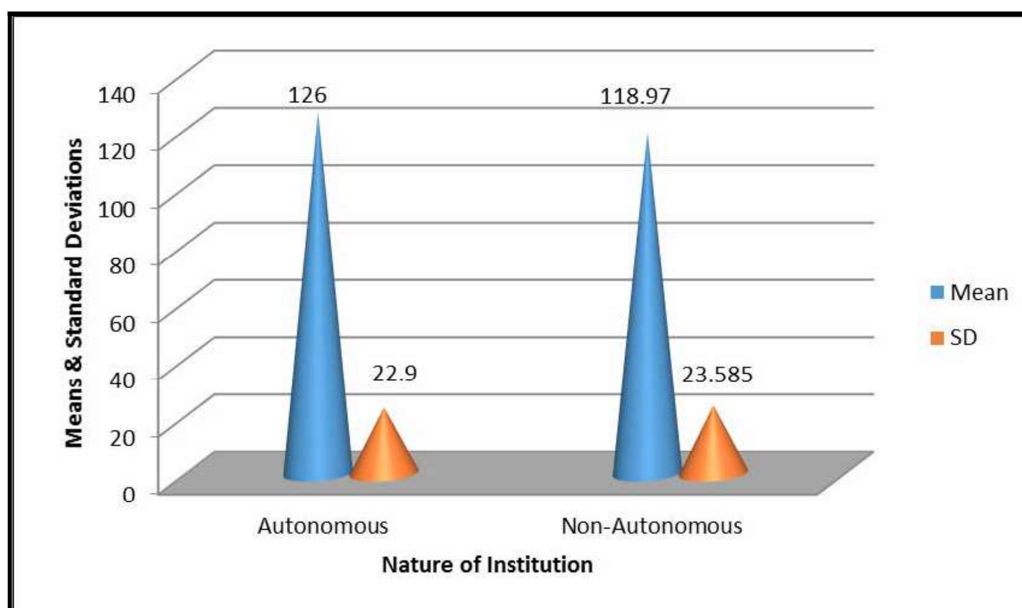


Figure 4.36: Cone Chart showing Means and Standard Deviations of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Nature of Institution

Hypothesis: 53 ($H_0$53)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Locality of the Institution, in which they are employed.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the teachers working in urban and rural Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.54

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Locality of the Institution

Variable	Locality of the Institution	N	Mean	SD	't'
ICT Attitude	Urban	373	125.28	22.433	4.346*
	Rural	294	117.39	24.299	

*Significant at 0.05 level

From Table 4.54, it is evident that t-value (4.346) is significant at 0.05 level with df = 665. It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of the Locality of the Institution, in which they are employed"* is REJECTED.

Further, it can be seen that the mean ICT Attitude score of the teachers working in urban colleges (125.28) is slightly higher than the mean score (117.39) of the teachers belonging to rural colleges. It is therefore concluded that the teachers working in urban Arts and Science colleges are better in their ICT Attitude than the teachers working in rural Arts and Science Colleges of Bharathidasan University region.

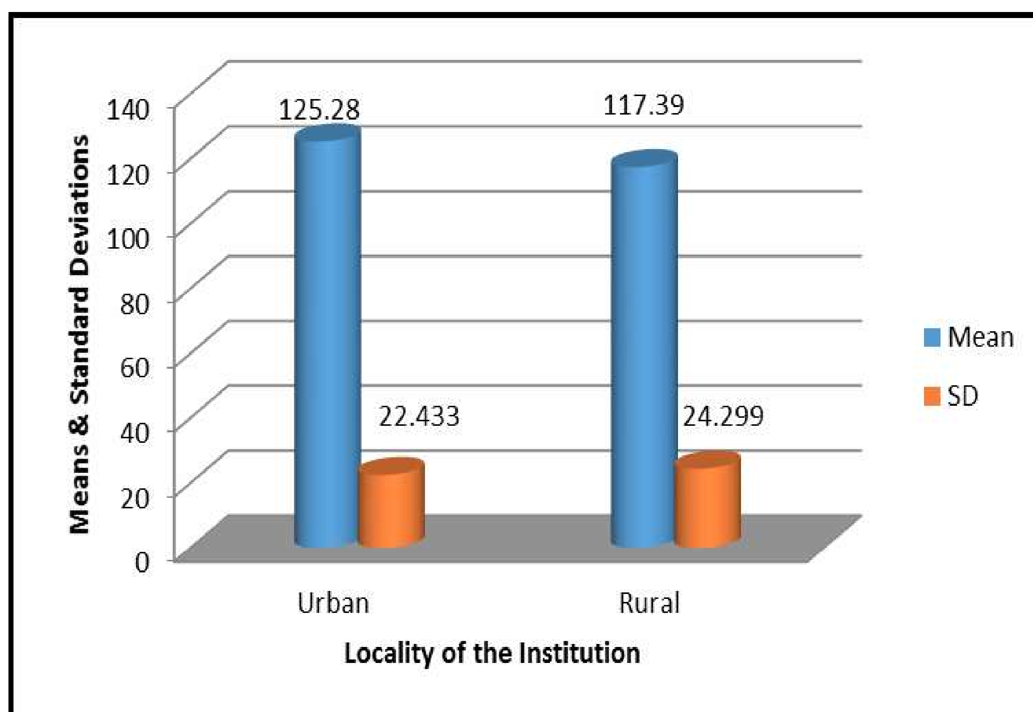


Figure 4.37: Cylinder Chart showing Means and Standard Deviations of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Locality of the Institution

Hypothesis: 54 ($H_0$54)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of availability of personal computer at home, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.55

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home

Variable	Availability of Personal Computer at Home	N	Mean	SD	't'
ICT Attitude	Yes	531	123.86	23.786	4.517*
	No	136	113.76	21.004	

*Significant at 0.05 level

From the Table 4.55, it is evident that t-value (4.517) is significant at 0.05 level with df = 665. It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home",* is REJECTED.

Further, it can be seen that the mean ICT Attitude score of the teachers who have personal computer at home (123.86) is higher than the mean score of the teachers who do not have personal computers at home (113.76). It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region who have personal computer at home are slightly better in their ICT Attitude than the teachers who do not possess personal computer at home.

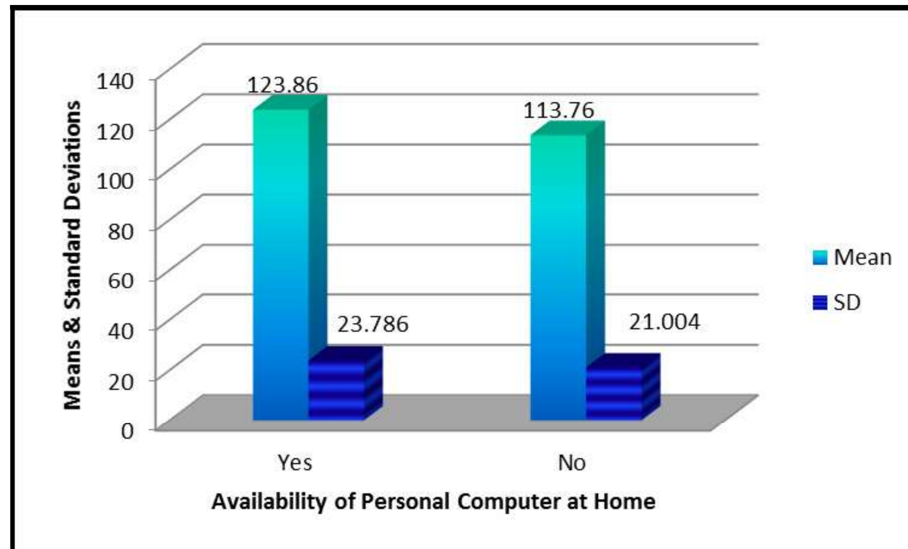


Figure 4.38: Column Chart showing Means and Standard Deviations of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Personal Computer at Home

Hypothesis: 55 ($H_0$55)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who have and who do not have internet connectivity at home, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.56

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home

Variable	Availability of Internet Connectivity at Home	N	Mean	SD	't'
ICT Attitude	Yes	451	124.56	24.298	4.424*
	No	216	116.04	20.928	

*Significant at 0.05 level

From Table 4.56, it is evident that t-value (4.424) is significant at 0.05 level with df = 665. It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home"* is REJECTED.

Further, it can be seen that the mean ICT Attitude score of the teachers who have internet connectivity at home (124.56) is higher than the mean score (116.04) of the teachers who do not have internet connectivity at home. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region who have internet connectivity at home are slightly better in their ICT Attitude, than the teachers who do not have internet connectivity at home.

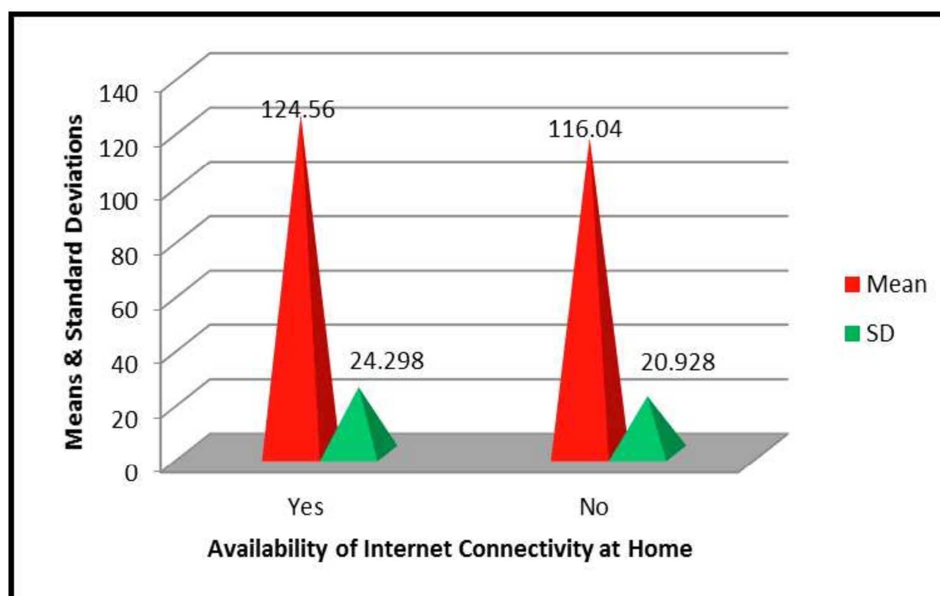


Figure 4.39: Cone Chart showing Means and Standard Deviations of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at Home

Hypothesis: 56 ($H_0$56)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of internet access on mobile, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.57

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile

Variable	Internet Access on Mobile	N	Mean	SD	't'
ICT Attitude	Yes	442	125.26	22.317	5.424*
	No	225	115.00	24.559	

* Significant at 0.05 level

From Table 4.57, it is evident that t-value (5.424) is significant at 0.05 level with df = 665. It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile"* is REJECTED.

Further, it can be seen that the mean ICT Attitude score of the teachers, who have internet access on mobile (125.26) is higher than the mean score (115.00) of the teachers, who do not have internet access on mobile. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region, who have internet access on mobile are better in their ICT Attitude than the teachers, who do not have internet access on mobile.

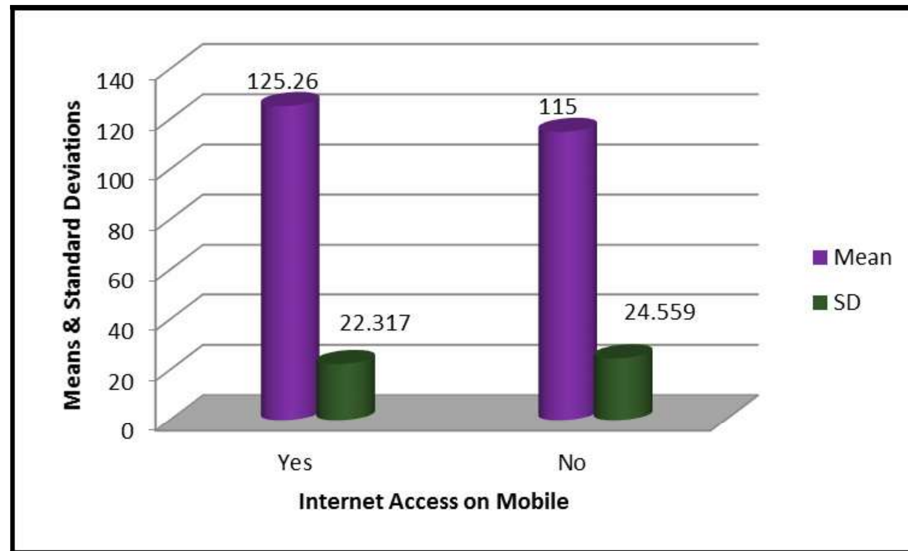


Figure 4.40: Cylinder Chart showing Means and Standard Deviations of the ICT Attitude Scores of Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Internet Access on Mobile

Hypothesis: 57 ($H_0$57)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, with different lengths of experience with computer viz. Less than 1 year, 1-2 years, 2-4 years, 4-6 years and 6 years and above, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.58

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	75630.266	4	18907.567	42.458*
Within Groups	294806.813	663	445.328	

*Significant at 0.05 level

From Table 4.58, it is evident that F-value (42.458) is significant at 0.05 level with df (4,663). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their computer experience span, differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer"* IS REJECTED.

As significant difference is found among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of experience with computer, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.58 (a)

Duncan's Post Hoc Analysis of the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer

Length of Experience with Computer	N	Subset for Alpha = 0.05			
		1	2	3	4
Less than 1 year	53	107.57			
1-2 years	90	102.99			
2-4 years	112		115.54		
4-6 years	74			122.28	
6 years and above	338				131.01

Table 4.58(a) shows that, the mean ICT Attitude scores, 107.57 and 102.99 are located in subset 1, 115.54 is located in subset 2, 122.28 is located in subset 3 and 131.01 is located in subset 4 at 0.05 level. It is understood that there is significant difference in the mean ICT Attitude scores of the teachers with experience less than 1 year and teachers with 1-2 years of experience. Significant difference has been found in the mean ICT Attitude scores of the teachers of the above two groups and the scores of the teachers with 2-4 years of experience. The mean ICT Attitude scores of the teachers of the above three groups have significant difference with the scores of the teachers with 4-6 years of experience. Similarly, significant difference has been found in the mean ICT Attitude scores of the teachers of the above four groups with that of the teachers with computer experience for 6 years and above.

The mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing computer experience for less than 1 year, 1-2 years, 4-6 years and 6 years and above are 107.57, 102.99, 115.54, 122.28 and 131.01 respectively. The mean ICT Attitude score

of the teachers with 6 years and above experience is higher than that of their counterparts. It is therefore concluded that the teachers with 6 years and above experience with computer are better in their ICT Attitude than the teachers with lower computer experience span.

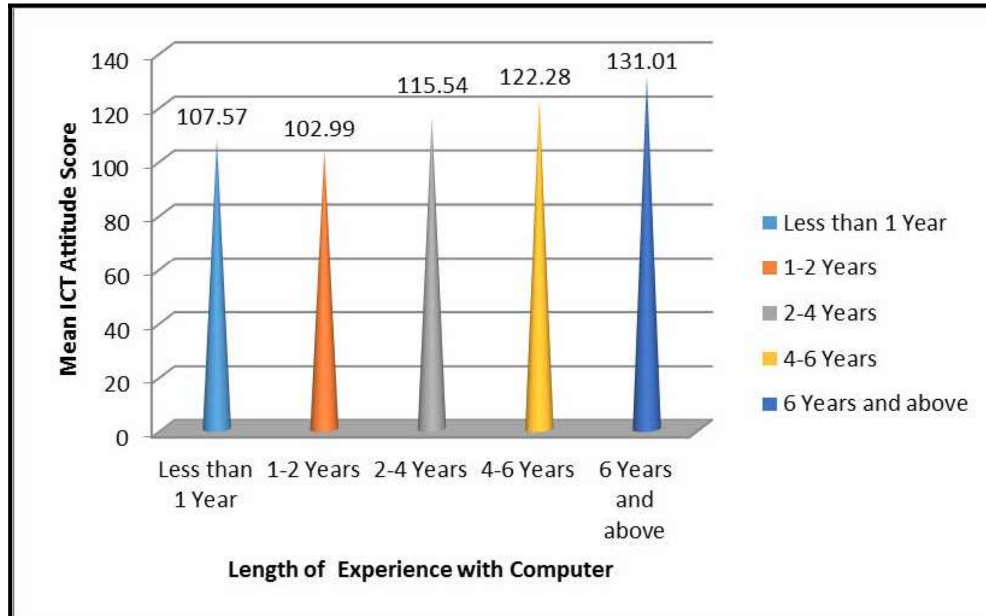


Figure 4.41: Cone Chart showing the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Experience with Computer

Hypothesis: 58 ($H_0$58)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region with different frequency of computer usage viz. daily, on alternate days, once in a fortnight or so, once in a month or so and never, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.59

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	39713.318	4	9928.330	19.873*
Within Groups	330723.761	663	499.583	

*Significant at 0.05 level

From Table 4.59, it is evident that F-value (19.873) is significant at 0.05 level with df (4,663). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their frequency of computer usage differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage"* is REJECTED.

As significant difference is found among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their frequency of computer usage, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.59(a)

Duncan's Post Hoc Analysis of the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage

Frequency of Computer Usage	N	Subset for Alpha = 0.05	
		1	2
Never	10	106.70	
Once in a fortnight or so	76	110.80	
Once in a month or so	42	111.50	
On alternate days	189	116.13	
Daily	350		128.91

Table 4.59(a) shows that the mean ICT Attitude scores, 106.70, 110.80, 111.50, and 116.13 are located in subset 1 whereas 128.91 is located in subset 2 at 0.05 level. It is understood that there is a significant difference between the mean ICT Attitude scores of the teachers who never use the computer and the scores of the teachers who use the computer once in a fortnight or so. There is a significant difference in the mean ICT Attitude scores of the teachers of the above two groups and the scores of the teachers who use the computer once in a month or so. Significant difference is observed in the mean ICT Attitude scores of the teachers of the above three groups and the scores of the teachers who use the computer on alternate days. There is a significant difference in the mean ICT Attitude scores of the teachers of the above four groups and the mean ICT Attitude scores of the teachers who use the computer daily.

From the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region who use the computer Never

(106.70), once in a fortnight or so (110.80), once in a month or so (111.50), on alternate days (116.13) and daily (116.13), the mean ICT Attitude scores of the teachers who use computer daily is higher than that of their counterparts. It is therefore concluded that the teachers who use the computer daily are better in their ICT Attitude, than the teachers of remaining categories.

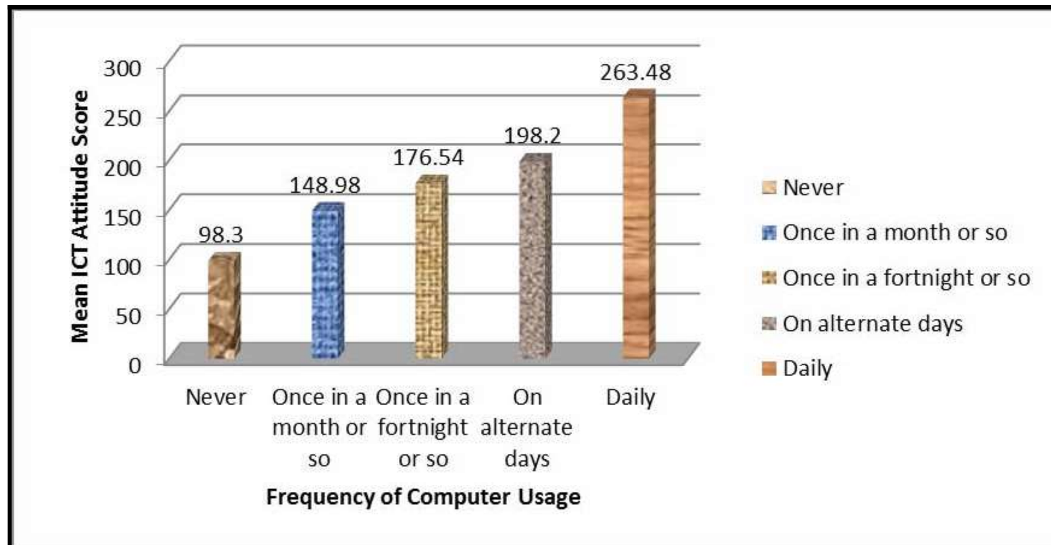


Figure 4.42: Column Chart showing the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Frequency of Computer Usage

Hypothesis: 59 ($H_0$59)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience.

In order to find out whether there is a significant difference among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing with internet experience spans viz. Less than 1 year, 1-2 years, 2-4years, 4-6years and 6 years and above, the above null hypothesis was formulated and one-way ANOVA was attempted to test the same.

Table 4.60

Summary of ANOVA showing the Significance of Difference among the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square (Variance)	F-value
Between Groups	78250.065	4	19562.516	44.322*
Within Groups	292187.014	663	441.370	

*Significant at 0.05 level

From Table 4.60, it is evident that F-value (44.322) is significant at 0.05 level with df (4,663). It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of internet experience differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience"* is REJECTED.

As significant difference is found among the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their length of internet experience, Duncan's Post Hoc analysis was attempted to locate the significance of difference.

Table 4.60(a)

Duncan's Post Hoc Analysis of the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience

Length of Internet Experience	N	Subset for Alpha = 0.05			
		1	2	3	4
Less than 1 year	60	104.88			
1-2 years	116	107.11			
2-4 years	141		117.57		
4-6 years	84			126.88	
6 years and above	266				132.66

Table 4.60(a) shows that the mean ICT Attitude scores, 104.88 and 107.11 are located in subset 1, 117.57 is located in subset 2, 126.88 is located in subset 3 and 132.66 is located in subset 4 at 0.05 level. It is understood that there is significant difference in the mean ICT Attitude scores of the teachers with experience less than 1 year and teachers with 1-2 years of experience. Significant difference has been found in the mean ICT Attitude scores of the teachers of the above two groups and the teachers with 2-4 years of experience. There is a significant difference between the mean ICT Attitude scores of the teachers of the above three groups and the teachers with 4-6 years of experience. Similarly, significant difference has been found in the mean ICT Attitude scores of the teachers of the above four groups and the teachers with experience for 6 years and above.

The mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region possessing internet experience for, less than 1 year, 1-2 years, 4-6 years and 6 years and above are 104.88, 107.11,

117.57, 126.88 and 132.66 respectively. The mean ICT Attitude scores of the teachers with internet experience for 6 years and above, is higher than that of their counterparts. It is therefore concluded that the teachers with internet experience for 6 years and above are better in their ICT Attitude, than the teachers with lower internet experience span.

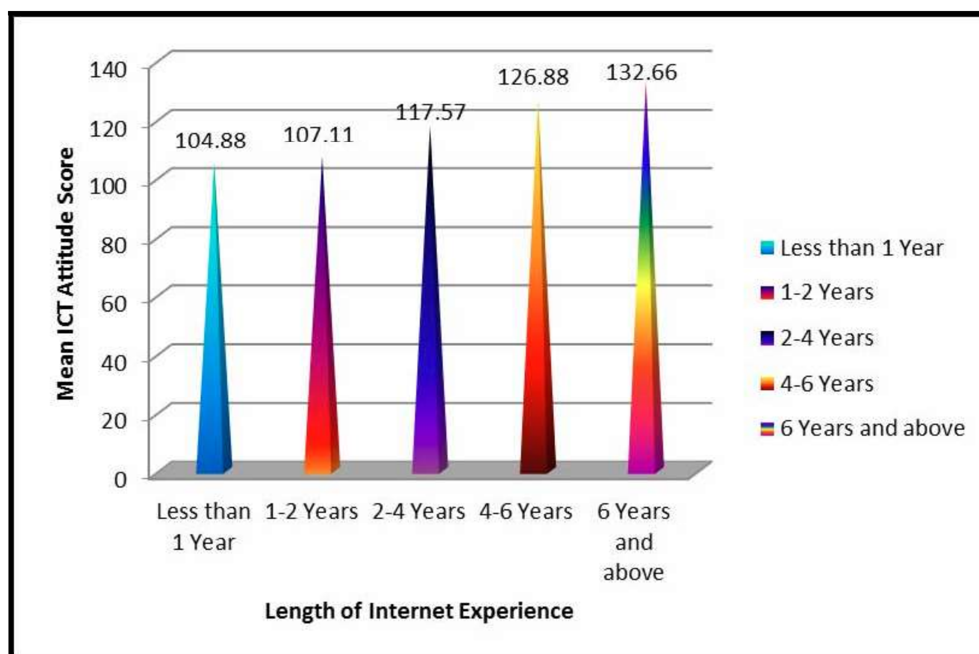


Figure 4.43: Cone Chart showing the Mean ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Length of Internet Experience

Hypothesis: 60 ($H_0$60)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of ICT Devices in their Institution for Facilitating Learning.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, with and without ICT devices in their institution, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.61

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of ICT Devices in their Institution

Variable	Availability of ICT Devices at Institution	N	Mean	SD	't'
ICT Attitude	Yes	658	121.81	23.671	0.131*
	No	9	120.78	16.984	

* Not significant at 0.05 level

From Table 4.61, it is evident that t-value (0.131) is not significant at 0.05 level with df = 665. It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region do not differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of ICT Devices in their Institution for Facilitating Learning"* is NOT REJECTED.

Further, it can be seen that the mean ICT Attitude score of the teachers who have ICT devices in their institution (121.81) is higher than the mean score (120.78) of the teachers who do not have ICT devices in their institution. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region, who have ICT devices in their institution are slightly better in their ICT Attitude than the teachers, who do not have ICT devices in their institution for facilitating learning.

Hypothesis: 61 ($H_0$61)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges for Facilitating Learning.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who have and who do not have computer access at their colleges for facilitating learning, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.62

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges

Variable	**Availability of Computer access at College**	**N**	**Mean**	**SD**	**'t'**
ICT Attitude	Yes	577	122.26	23.908	1.288*
	No	90	118.82	21.275	

* Not significant at 0.05 level

From Table 4.62, it is evident that t-value (1.288) is not significant at 0.05 level with df = 665. It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Computer Access at their Colleges for Facilitating Learning"* is NOT REJECTED.

Further, it can be seen that, the mean ICT Attitude score of the teachers who have computer access at their colleges (122.26) is higher than the mean score (118.82) of the teachers who do not have computer access at their colleges. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region who have computer access at their colleges are slightly better in their ICT Attitude than the teachers who do not possess computer access at their colleges.

Hypothesis: 62 ($H_0$62)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges for Facilitating Learning.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, with and without internet connectivity at their colleges for facilitating learning, the above null hypothesis was formulated and ‘t’ test was attempted to test the same.

Table 4.63

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges

Variable	Availability of Internet Connectivity at College	N	Mean	SD	‘t’
ICT Attitude	Yes	505	122.89	24.058	2.105*
	No	162	118.41	21.765	

* Significant at 0.05 level

From Table 4.63, it is evident that t-value (2.105) is significant at 0.05 level with df = 665. It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges for Facilitating Learning"* is REJECTED.

Further, it can be seen that the mean ICT Attitude score of the teachers who have internet connectivity at college (122.89) is higher than the mean score (118.41) of the teachers who do not have internet connectivity at college. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region, who have internet connectivity at their colleges are slightly better in their ICT Attitude than the teachers, who do not have internet connectivity at their colleges for facilitating learning.

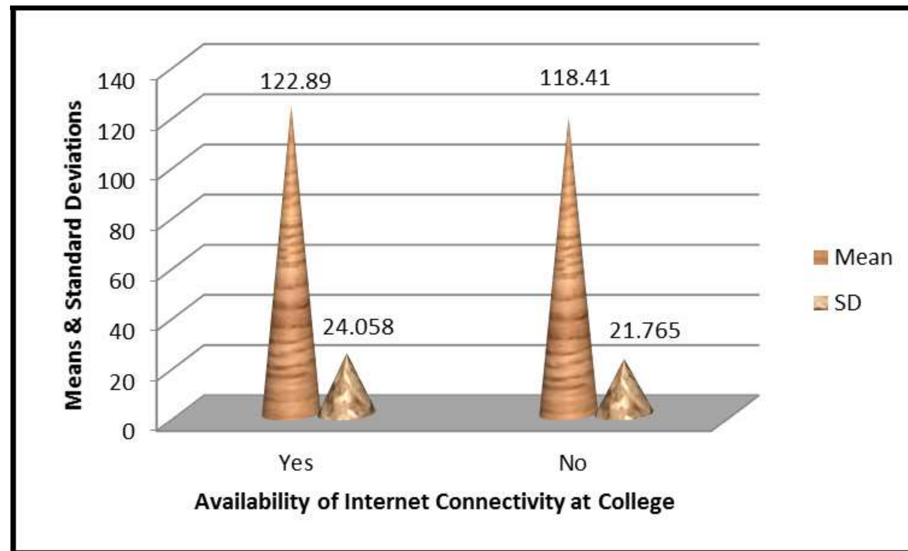


Figure 4.44: Cone Chart showing Means and Standard Deviations of the ICT Attitude Scores of Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of Availability of Internet Connectivity at their Colleges

Hypothesis: 63 ($H_0$63)

There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Participation in ICT Training Programmes.

In order to find out whether there is a significant difference between the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, who have and who have not participated in ICT training programmes, the above null hypothesis was formulated and 't' test was attempted to test the same.

Table 4.64

Means, Standard Deviations and t-value of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Participation in ICT Training Programmes

Variable	Participation in ICT Training Programmes	N	Mean	SD	't'
ICT Attitude	Yes	53	133.87	20.056	3.925*
	No	614	120.76	23.590	

* Significant at 0.05 level

From Table 4.64, it is evident that t-value (3.925) is significant at 0.05 level with df = 665. It indicates that the mean ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region differ significantly. Hence, the null hypothesis, *"There is no significant difference in the ICT Attitude scores of the teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their participation in ICT Training Programmes"* is REJECTED.

Further, it can be seen that the mean ICT Attitude score of the teachers who have undergone ICT training programmes (133.87) is higher than the mean score (120.76) of the teachers who have not undergone ICT training

programmes. It is therefore concluded that the teachers of Arts and Science Colleges of Bharathidasan University region, who have undergone ICT training programmes are better in their ICT Attitude than the teachers, who have not undergone ICT training programmes.

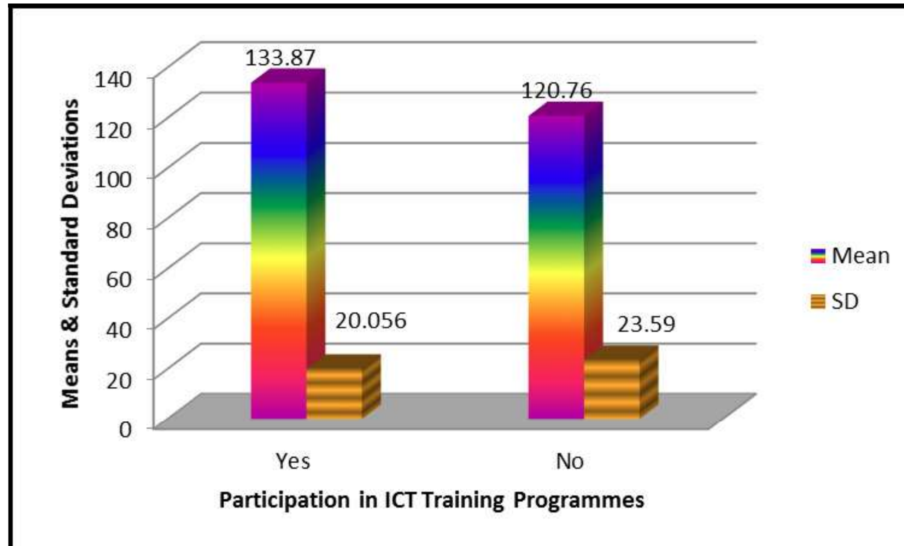


Figure 4.45: Column Chart showing Means and Standard Deviations of the ICT Attitude Scores of the Teachers of Arts and Science Colleges of Bharathidasan University region, sub-grouped on the basis of their Participation in ICT Training Programmes

4.4. Relational Analysis of Data

Relational analysis attempts to determine the degree of relationship existing between two or more variables. For the present study, Pearson Product Moment correlation (r) is used to measure the relationship among the dependent variables, viz., Information and Communication Technology Knowledge, Information and Communication Technology Skills and Information and Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region.

Hypothesis: 64 ($H_0$64)

There is no significant relationship between the Information and Communication Technology Knowledge and Information and Communication Technology Skills of the teachers of Arts and Science Colleges of Bharathidasan University region.

In order to find out whether there exists any significant relationship between the Information and Communication Technology Knowledge and Information and Communication Technology Skills of the teachers of Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and the Pearson Product Moment Correlation (r) was attempted to test the same.

Table 4.65

Correlation between the Information and Communication Technology Knowledge and Information and Communication Technology Skills of the Teachers of Arts and Science Colleges of Bharathidasan University region

Variables	N	r	Remarks
ICT Knowledge and ICT Skills	667	0.526	Significant at 0.01 level

Table 4.65 shows the relationship between ICT knowledge and ICT skills of teachers of Arts and Science Colleges of Bharathidasan University region. It reveals that the r-value (0.526) is significant at 0.01 level. It is noted that ICT Knowledge and ICT Skills are correlated significantly. Hence, the hypothesis, *“There is no significant relationship between the Information and Communication Technology Knowledge and Information and Communication Technology Skills of the teachers of Arts and Science Colleges of Bharathidasan University region”* is REJECTED.

Further, it is concluded that there is a high positive correlation between the Information and Communication Technology Knowledge and Information and Communication Technology Skills of the teachers of Arts and Science Colleges of Bharathidasan University region.

Hypothesis: 65 ($H_0$65)

There is no significant relationship between the Information and Communication Technology Knowledge and Information and Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region.

In order to find out whether there exists any significant relationship between the Information and Communication Technology Knowledge and Information and Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and the Pearson Product Moment Correlation (r) was attempted to test the same.

Table 4.66

Correlation between the Information and Communication Technology Knowledge and Information and Communication Technology Attitude of the Teachers of Arts and Science Colleges of Bharathidasan University region

Variables	N	r	Remarks
ICT Knowledge and ICT Attitude	667	0.563	Significant at 0.01 level

Table 4.66 shows the relationship between ICT Knowledge and ICT Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region. It reveals that the r-value (0.563) is significant at 0.01 level. It is noted that ICT Knowledge and ICT Attitude are correlated significantly. Hence, the hypothesis, *"There is no significant relationship between the Information and Communication Technology Knowledge and Information and*

Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region" is REJECTED.

Further, it is concluded that there is a high positive correlation between the Information and Communication Technology Knowledge and Information and Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region.

Hypothesis: 66 ($H_0$66)

There is no significant relationship between the Information and Communication Technology Skills and Information and Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region.

In order to find out whether there exists any significant relationship between the Information and Communication Technology Skills and Information and Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region, the above null hypothesis was formulated and the Pearson Product Moment Correlation (r) was attempted to test the same.

Table 4.67

Correlation between the Information and Communication Technology Skills and Information and Communication Technology Attitude of the Teachers of Arts and Science Colleges of Bharathidasan University region

Variables	N	r	Remarks
ICT Skills and ICT Attitude	667	0.612	Significant at 0.01 level

Table 4.67 shows the relationship between the Information and Communication Technology Skills and Information and Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region. It reveals that the r-value (0.612) is

significant at 0.01 level. It is noted that ICT Skills and ICT Attitude are correlated significantly. Hence, the hypothesis, *"There is no significant relationship between the Information and Communication Technology Skills and Information and Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region"* is REJECTED.

Further, it is concluded that there is a high positive correlation between the Information and Communication Technology Skills and Information and Communication Technology Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region.

4.5. Regression Analysis of Data

Regression analysis is used to assess the relationship between one dependent variable and several independent variables. In this study, ICT Attitude of the teachers of Arts and Science Colleges of Bharathidasan University region is taken as the dependent variable whereas their ICT Knowledge and ICT Skills are taken as independent variables.

4.5.1. Multiple Regression of ICT Knowledge and ICT Skills on ICT Attitude

Regression analysis is attempted with the following objective:

- To find out the differential effect of ICT Knowledge and ICT Skills of the Arts and Science College Teachers of Bharathidasan University region on their Attitude towards Integration of ICT in Teaching and Learning.

In line with the above objective, the following research hypothesis was formulated:

- There will be a differential effect of ICT Knowledge and ICT Skills of the Arts and Science College Teachers of Bharathidasan University region on their Attitude towards Integration of ICT in Teaching and Learning.

Dependent Variable - ICT Attitude Score (Y)

Independent Variable - ICT Knowledge Score (X1)

- ICT Skills Score (X2)

Table 4.68

Multiple Regression of ICT Knowledge and ICT Skills on ICT Attitude of the Teachers of Arts and Science Colleges of Bharathidasan University Region

S.No.	Variable	Unstandardized Coefficients		Standardized Coefficients β	't' Value	'P' Value
		B	Std. Error			
1	ICT Knowledge Score	1.242	0.126	0.333	9.879	0.000
2	ICT Skills Score	0.092	0.007	0.437	12.958	0.000
3	Constant	77.481	2.173		35.649	0.000

The results in the above table indicate that the contribution of the ICT Knowledge and ICT Skills on ICT Attitude.

R value = 0.674

R^2 value = 0.455

F value = 276.713

P value = 0.000

From the above table, the multiple regression equation is as follows:

$$Y = 77.481 + 0.333\ X1 + 0.437\ X2$$

From the analysis of variance, the 'P' value is 0.000. This indicates that the regression model is statistically significant at 1% level. The R^2 value, 0.455 shows that the proportion of the dependent variable's (ICT Attitude Score)

variance can be attributed to, or explained by, variance in the independent variables (ICT Knowledge and ICT Skills). The F test value of 276.713 indicates that the null hypothesis that the beta coefficients of ICT Skills Score, ICT Knowledge Score are zero is rejected at higher level of significance. The changes in the score of ICT Knowledge and Skills contribute to changes in their attitude towards integrating ICT into teaching and learning.

As the ‘t’ values of the two predictor variables are larger and ‘P’ values are less than 0.05 the regression coefficients of the two variables are considered fit for interpretation of the relationship under study. The beta coefficient of ICT knowledge shows that the relationship between ICT knowledge and attitude is positive and more than proportionate. One unit change in ICT knowledge score contributes 1.242 unit changes in the ICT attitude score when the ICT skills score remains constant. The change in ICT knowledge contributes more than proportionate change in ICT attitude. The beta coefficient of ICT skills shows that the relationship between ICT skills and attitude is also positive but less than proportionate. One unit change in ICT skills score creates 0.094 unit change in ICT attitude score. The ICT knowledge contributes more to ICT attitude than ICT skills as shown by the sizes of the respective coefficients which are estimated to be 1.242 and 0.094. (i.e. $\beta_1 > \beta_2$).

4.6. Conclusion

As detailed above, the data collected from 667 teachers from 43 Arts and Science Colleges of Bharathidasan University region, through the administration of tools were analyzed by Percentage analysis, ‘t’ test, ANOVA, Relational analysis (Pearson Product Moment Correlation) and Regression analysis. The same are presented in appropriate tables as well as charts. The findings and conclusions that emerged from the interpretation of data are presented in the next chapter with suggestions and recommendations.

Chapter – V

Summary of Findings, Conclusions, Suggestions and Recommendations

CHAPTER V
SUMMARY OF FINDINGS, CONCLUSIONS, SUGGESTIONS AND RECOMMENDATIONS

We shall not cease from exploration, and the end of all our exploring will be to arrive where we started and know the place for the first time

T.S. Eliot

5.1. Introduction

This chapter summarizes the work done, discusses meaning of research results, addresses the consequences of the result by relating them to the more general conceptual frame work of the research topic and offers suggestion and recommendations on the basis of the findings and conclusions.

In the previous chapters, the relevant theoretical aspects and different stages of conducting the survey were presented. This chapter is devoted for presenting the most significant element of the research i.e., the outcome of the research work. Any research is evaluated on the basis of the objectives formulated, the accurate procedure adopted and the clear outcome of the survey. In this chapter, the focus of attention is the results or outcomes of the research and implications.

5.2. Summary of the Research Design

In order to present a holistic picture of the entire study and to help the interpretation of the outcomes of the study from the point of view of the objectives, hypothesis and methodology, before presenting and discussing the findings and conclusions, the research design is presented in a nutshell here:

The problem of the study is, "Information and Communication Technology: Knowledge, Skills and Attitude of Arts and Science College Teachers of Bharathidasan University region".

The present study with a sample of the teachers of the Arts and Science colleges of Bharathidasan University region was conducted on the following hypotheses:

- The teachers of Arts and Science Colleges of Bharathidasan University region do not have any ICT Knowledge.
- The teachers of Arts and Science Colleges of Bharathidasan University region do not have any ICT Skills.
- The ICT Attitude of teachers of Arts and Science Colleges of Bharathidasan University region is unfavourable.
- There is no significant difference in the ICT Knowledge of teachers of Arts and Science Colleges of Bharathidasan University region, with respect to certain select variables.
- There is no significant difference in the ICT Skills of Arts and Science College teachers of Bharathidasan University region, with respect to certain select variables.
- There is no significant difference in the ICT Attitude of Arts and Science College teachers of Bharathidasan University region, with respect to certain select variables.
- There is a no significant correlation between the ICT Knowledge and ICT Skills of Arts and Science College teachers of Bharathidasan University region.
- There is a no significant correlation between the ICT Knowledge and ICT Attitude of Arts and Science College teachers of Bharathidasan University region.
- There is a no significant correlation between the ICT Skills and ICT Attitude of Arts and Science College teachers of Bharathidasan University region.
- The changes in ICT Knowledge and ICT Skills do not contribute to change in the attitude of Arts and Science College teachers of Bharathidasan University region towards integrating ICT into teaching and learning.

As the study is descriptive by nature, normative study was adopted. As many as 667 teachers serving in 43 Arts and Science Colleges of Bharathidasan University region were chosen through Stratified Random Sampling technique to form the sample. In order to assess the Information and Communication Technology Knowledge, Skills and Attitude (ICT-KSA) of the teachers of Bharathidasan University region, the following tools, developed and validated by the investigator were used.

- ICT Knowledge Questionnaire (ICT-KQUEST)
- ICT Skills Assessment Scale (ICT-SAS)

Besides these, Attitude towards the Use of Information and Communication Technology (ICT) in Teaching Scale (ATUITS), developed by Rajasekar (2014) was also used for collecting data. In addition, a General Information Questionnaire was also used for collecting baseline data.

After collecting the data, the investigator did the work of classifying, tabulating and recording the data in order to ensure perfect interpretation of data. The entire data were processed and analysed by making use of the Statistical Package for Social Sciences – (SPSS-16). The data were subjected to appropriate descriptive, differential, correlational analysis and multiple regression analysis.

The findings that emerged from the analyses and the conclusions thereof are given below and discussed subsequently.

5.3. Findings of the Study

On the basis of the differential analyses, the study has come out with the following major findings. From the analyses, it can be understood that among the 667 teachers serving in 43 Arts and Science colleges of Bharathidasan University region who formed the sample

- 12.1% are Lecturers, 67.8% are Assistant Professors and 20.1% are Associate Professors

- 42.42% are male and the remaining 57.57% are female.
- 39.1% are in the age group of 24 to 34, 37.3% are between 35 and 45 years and the remaining 23.5% are between 46 and 56 years of age.
- 32.2%, 46.6% and 21.1% possess M.A. M.Sc. and M.Com. and M.B.A. qualifications respectively.
- 29.1%, have B.Ed., 6.9% have M.Ed., whereas 59.8% possess neither B.Ed. nor M.Ed., and 4.2% have other professional degrees viz. PGDCA, MCA etc.
- 52.6% have M.Phil, 19.6% have Ph.D., 22.2% have both M.Phil. and Ph.D., whereas 5.5% of have neither M.Phil. nor Ph.D.
- 31.2%, 23.5% and 45.3% are working in the government, government aided and self-financing colleges respectively.
- 3.7%, 35.5% and 60.7% work in men’s, women’s and co-educational institutions respectively.
- 40.2% and 59.8% work in autonomous and non-autonomous colleges respectively.
- 55.9% and 44.1% work in urban and rural colleges respectively.
- 79.6% have and 20.4% do not have personal computer at home.
- 67.6% have and 32.4% do not have internet connectivity in their home.
- 66.26% have and 33.73% do not have internet access on their mobile.
- 7.9%, 13.5%, 16.8%, 11.1% and 50.7% have the length of experience with computers for a period less than one year, 1-2 years, 2-4 years, 4-6 years and 6 years and above respectively.
- 52.5%, 28.3%, 11.4%, 6.3% and 1.5% use computers daily, on alternative days, once in a fortnight or so, once in a month or so and never respectively.
- 9%, 17.4%, 21.1%, 12.6% and 39.9% have the length of experience with internet for a period less than one year, 1-2 years, 2-4 years, 4-6 years and for 6 years and above respectively.

- 98.7% have and 1.3% do not have ICT devices in their institution for facilitating learning.
- 86.5% have and 13.5% do not have computer access in their colleges for facilitating learning.
- 75.7% have and 24.3% do not have internet connectivity in their colleges for facilitating learning.
- Only 53 (7.9%) have undergone some kind of training programme for integrating ICT into teaching. On the other hand, the major part of them 614 (92.1%) did not undergo any such training programmes.

5.3.1 Key Findings related to Information and Communication Technology Knowledge, Skills and Attitude (ICT-KSA)

- The mean ICT Knowledge score of the Arts and Science College Teachers of Bharathidasan University region is 19.08 as against the maximum obtainable score of 37. This indicates that the teachers of the Arts and Science Colleges of Bharathidasan University region possess an Average level of ICT Knowledge. The data further reveal that out of 667 teachers, 13.49% have a Low level ICT Knowledge, 64.46% have an Average level ICT Knowledge and 22.03% have a High level of ICT Knowledge.
- The mean ICT Skills score of the Arts and Science College Teachers of Bharathidasan University region is 225.39 as against the maximum obtainable score of 570. This indicates that the teachers of the Arts and Science Colleges of Bharathidasan University region possess a Moderate level of ICT Skills. The data further reveal that out of 667 teachers, 37.03% have Low level ICT Skills, 53.67% are Moderately Skilled and 09.29% are Highly Skilled in their ICT.
- The mean ICT Attitude score of the Arts and Science College Teachers of Bharathidasan University region is 121.80 as against the maximum obtainable score of 185. Out of 667 teachers, 1.04% have unfavourable attitude, 46.47% have neutral attitude whereas 52.47% have favourable

attitude. This indicates that, the teachers of the Arts and Science Colleges of Bharathidasan University region have a favourable ICT Attitude towards ICT integration into teaching and learning.

5.3.2. Findings related to ICT Knowledge

- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their designations do not differ significantly, but the Assistant Professors are found to be slightly better in their ICT Knowledge than the Lecturers and Associate Professors.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of sex, do not differ significantly. But, the female teachers are found to be slightly better than the male teachers in their ICT Knowledge.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their age differ significantly. Among them, the teachers of 24-34 age group are better in their ICT Knowledge, than those of 35-45 and 46-56 age groups.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their academic qualifications differ significantly. Among them, the teachers with M.Sc. qualification are better in their ICT Knowledge than the teachers with M.A., M.Com. and M.B.A. qualifications.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their professional qualifications differ significantly. Among them, the teachers with PGDCA, MCA etc., are better in their ICT knowledge than those with B.Ed. or M.Ed. and those with no professional degree.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of

their research qualifications do not differ significantly. But, the teachers with both M.Phil. and Ph.D. degrees are slightly better in their ICT Knowledge than those with either M.Phil. or Ph.D.

- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the category of the institution, where they are employed differ significantly. Among them, the teachers working in Government-aided colleges have better ICT Knowledge than the teachers working in Government and Self-financing colleges.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the type of institution where they are employed do not differ significantly. But, the teachers working in Men's colleges are slightly better in their ICT Knowledge than their counterparts working in Women's as well as Co-educational colleges.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the nature of institution where they are employed differ significantly. Among them, the teachers working in autonomous colleges are better in their ICT Knowledge than the teachers working in non-autonomous colleges.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the locality of the institution where they are employed differ significantly. Among them, the teachers working in urban colleges are better in their ICT Knowledge than the teachers working in rural colleges.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of availability of personal computer at home differ significantly. Among them, the teachers, who have personal computer at home are better in

their ICT Knowledge than the teachers, who do not have personal computer at home.

- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of availability of internet connectivity at home differ significantly. Among them, the teachers, who have internet connectivity at home are better in their ICT Knowledge than the teachers, who do not have internet connectivity at home.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of internet access on their mobile differ significantly. Among them, the teachers, who access internet on their mobile are better in their ICT Knowledge than the teachers, who do not access internet on their mobile.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their length of experience with computer differ significantly. Among them, the teachers, with computer experience for a period of 6 years and above are better in their ICT Knowledge than the teachers, with lower computer experience span.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their frequency of computer usage differ significantly. Among them, the teachers, who use computers daily are better in their ICT Knowledge than the teachers, with lower computer usage frequency.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their length of internet experience differ significantly. Among them, the teachers with internet experience for a period of 6 years and above are better in their ICT Knowledge than the teachers with lower internet experience span.

- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the availability of ICT devices in their institution do not differ significantly. But, the teachers, who do not have ICT devices in their institution are slightly better in their ICT Knowledge than the teachers, who have ICT devices in their institution.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the availability of computer access at their colleges differ significantly. Among them, the teachers, who have computer access at their colleges are better in their ICT Knowledge than the teachers, who do not have computer access at their colleges.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of availability of internet connectivity at their colleges do not differ significantly. But, the teachers, who have internet connectivity at their colleges are slightly better in their ICT Knowledge than the teachers, who do not have internet connectivity at their colleges.
- The mean ICT Knowledge scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their participation in training programme for integrating ICT into teaching differ significantly. Among them, the teachers, who have undergone training programme for integrating ICT into teaching are better in their ICT Knowledge than the teachers, who have not undergone any such training.

5.3.3 Findings related to ICT Skills

- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their designations do not differ significantly, but the Assistant Professors are

found to be slightly better in their ICT Skills than Lecturers and Associate Professors.

- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of sex, do not differ significantly. But, the female teachers are found to be slightly better in their ICT Skills than the male teachers.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their age differ significantly. Among them, the teachers of 24-34 age group are better in their ICT Skills than those of 35-45 and 46-56 age groups.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their academic qualifications differ significantly. Among them, the teachers with M.Sc. qualification are better in their ICT Skills than the teachers with M.A., M.Com. and M.B.A. qualifications.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their professional qualifications differ significantly. Among them, the teachers with PGDCA, MCA etc., are better in their ICT Skills than those with B.Ed. or M.Ed. and those with no professional degrees.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their research qualifications do not differ significantly. But, the teachers with both M.Phil. and Ph.D. degrees are slightly better in their ICT Skills than those with either M.Phil. or Ph.D.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the category of the institution, where they are employed differ significantly. Among them, the teachers working in Government-aided colleges have better ICT Skills than the teachers working in Government and Self-financing colleges.

- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the type of institution where they are employed do not differ significantly. But, the teachers working in Men's colleges are slightly better in their ICT Skills than their counterparts working in Women's as well as Co-educational colleges.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the nature of institution where they are employed do not differ significantly. But, the teachers working in autonomous colleges are better in their ICT Skills than the teachers working in non-autonomous colleges.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the locality of the institution where they are employed do not differ significantly. But, the teachers working in urban colleges are better in their ICT Skills than the teachers working in rural colleges.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of availability of personal computer at home differ significantly. Among them, the teachers, who have personal computer at home are better in their ICT Skills than the teachers, who do not have personal computer at home.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of availability of internet connectivity at home differ significantly. Among them, the teachers, who have internet connectivity at home are better in their ICT Skills than the teachers, who do not have internet connectivity at home.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of internet access on mobile differ significantly. Among them, the teachers, who

access internet on their mobile are better in their ICT Skills than the teachers, who do not access internet on their mobile.

- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their length of experience with computer differ significantly. Among them, the teachers with computer experience for a period of 6 years and above are better in their ICT Skills than the teachers with lower computer experience span.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their frequency of computer usage differ significantly. Among them, the teachers, who use computers daily are better in their ICT Skills than the teachers, with lower computer usage frequency.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their length of internet experience differ significantly. Among them, the teachers with internet experience for a period of 6 years and above are better in their ICT Skills than the teachers with lower internet experience span.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the availability of ICT devices in their institution do not differ significantly. But, the teachers, who do not have ICT devices in their institution are slightly better in their ICT Skills than the teachers, who have ICT devices in their institution.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the availability of computer access at their colleges differ significantly. Among them, the teachers, who have computer access at their colleges are better in their ICT Skills than the teachers, who do not have computer access at their colleges.

- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of availability of internet connectivity at their colleges differ significantly. Among them, the teachers, who have internet connectivity at their colleges are slightly better in their ICT Skills than the teachers, who do not have internet connectivity at their colleges.
- The mean ICT Skills scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their participation in training programme for integrating ICT into teaching differ significantly. Among them, the teachers, who have undergone training programme for integrating ICT into teaching are better in their ICT Skills than the teachers, who have not undergone any such training.

5.3.4 Findings related to ICT Attitude

- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their designations differ significantly. Among them, the Associate Professors are found to be slightly better in their ICT Attitude than the Lecturers and Assistant Professors.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of sex, do not differ significantly. But the female teachers are found to be slightly better in their ICT Attitude than the male teachers.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their age do not differ significantly. Among them, the teachers of 35-45 age group are better in their ICT Attitude than those of 24-34 and 46-56 age groups.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their academic qualifications differ significantly. Among them, the teachers

with M.Sc. qualification are better in their ICT Attitude than the teachers with M.A., M.Com. and M.B.A. qualifications.

- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their professional qualifications differ significantly. Among them, the teachers with PGDCA, MCA etc., are better in their ICT Attitude than those with B.Ed. or M.Ed. and those with no professional degree.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their research qualifications differ significantly. Among them, the teachers with both M.Phil. and Ph.D. degrees are slightly better in their ICT Attitude than those, with either M.Phil. or Ph.D.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the category of the institution, where they are employed differ significantly. Among them, the teachers working in Government-aided colleges have better ICT Attitude than the teachers working in Government and Self-financing colleges.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the type of institution, where they are employed differ significantly. Among them, teachers working in Men's colleges are slightly better in their ICT Attitude, than their counterparts working in Women's as well as Co-education colleges.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the nature of institution, where they are employed differ significantly. Among them, the teachers working in autonomous colleges are better in their ICT Attitude than the teachers working in non-autonomous colleges.

- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the locality of the institution, where they are employed differ significantly. Among them, the teachers working in urban colleges are better in their ICT Attitude than the teachers working in rural colleges.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of availability of personal computer at home differ significantly. Among them, the teachers, who have personal computer at home are better in their ICT Attitude than the teachers, who do not have personal computer at home.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of availability of internet connectivity at home differ significantly. Among them, the teachers who, have internet connectivity at home are better in their ICT Attitude than the teachers, who do not have internet connectivity at home.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of internet access on mobile differ significantly. Among them, the teachers, who access internet on their mobile are better in their ICT Attitude than the teachers, who do not access internet on their mobile.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their length of computer experience differ significantly. Among them, the teachers with computer experience for a period of 6 years and above are better in their ICT Attitude than the teachers with lower computer experience span.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their frequency of computer usage differ significantly. Among them, the

teachers who use computers daily are better in their ICT Attitude than the teachers with lower frequency of computer usage.

- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their length of internet experience differ significantly. Among them, the teachers with internet experience for a period of 6 years and above are better in their ICT Attitude than the teachers with lower internet experience span.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the availability of ICT devices in their institution, where they are employed do not differ significantly. But, the teachers who have ICT devices in their institution are slightly better in their ICT Attitude than the teachers who do not have ICT devices in their institution.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of the availability of computer access at their colleges differ significantly. Among them, the teachers, who have computer access at their colleges are better in their ICT Attitude than the teachers, who do not have computer access at their colleges.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of availability of internet connectivity at their colleges differ significantly. Among them, the teachers, who have internet connectivity at their colleges are slightly better in their ICT Attitude than the teachers, who do not have internet connectivity at their colleges.
- The mean ICT Attitude scores of the Arts and Science college teachers of Bharathidasan University region, sub-grouped on the basis of their participation in training programme for integrating ICT into teaching differ significantly. Among them, the teachers, who have undergone training programme for integrating ICT into teaching are better in their

ICT Attitude than the teachers, who have not undergone any such training.

5.3.5. Findings related to the Relationship among ICT Knowledge, ICT Skills and ICT Attitude

- The major findings related to the relationship among Information and Communication Technology Knowledge, Information and Communication Technology Skills and Information and Communication Technology Attitude of the teachers of the Arts and Science colleges of Bharathidasan University region are as follows:
- There is a high positive correlation between the ICT Knowledge and ICT Skills of the teachers of the Arts and Science colleges of Bharathidasan University region.
- There is a high positive correlation between the ICT Knowledge and ICT Attitude of the teachers of the Arts and Science colleges of Bharathidasan University region.
- There is a high positive correlation between the ICT Skills and ICT Attitude of the teachers of the Arts and Science colleges of Bharathidasan University region.

5.3.6. Findings from the Regression Analysis

- The multiple regression of ICT Knowledge and ICT Skills on ICT Attitude of the teachers of the Arts and Science colleges of Bharathidasan University region reveals that the changes in ICT Knowledge and ICT Skills contribute to the changes in their ICT Attitude.

5.4. Conclusions of the Study

On the basis of the above findings, the following conclusions related to the ICT Knowledge, ICT Skills and ICT Attitude of the teachers of the Arts and Science colleges of Bharathidasan University region towards the Use of ICT for Teaching and Learning are drawn:

- ICT Knowledge of teachers of the Arts and Science Colleges of Bharathidasan University region is AVERAGE.
- The teachers of the Arts and Science Colleges of Bharathidasan University region are MODERATELY SKILLED in their ICT.
- The teachers of the Arts and Science Colleges of Bharathidasan University region have a FAVOURABLE ATTITUDE towards the use of ICT for Teaching and Learning.
- The variables viz., age, academic qualification and professional qualification of the teachers of the Arts and Science Colleges of Bharathidasan University region *influence* their ICT Knowledge.
- The variables viz. availability of personal computer at home, availability of internet connectivity at home, access to internet on mobile and participation in training programmes for integrating ICT into education of the teachers of the Arts and Science Colleges of Bharathidasan University region *influence* their ICT Knowledge.
- The variables viz., length of computer experience, frequency of computer usage and length of internet experience of the teachers of the Arts and Science Colleges of Bharathidasan University region *influence* their ICT Knowledge.
- The variables viz., sex, designation and research qualification of the teachers of the Arts and Science Colleges of Bharathidasan University region *do not influence* their ICT Knowledge.
- The variables viz., access to computer at the institution, category, nature and locality of institutions, where the teachers of the Arts and Science Colleges of Bharathidasan University region serve *influence* their ICT Knowledge.
- The variables viz., type of institution, availability of ICT devices and internet connectivity in institutions, where the teachers of the Arts and Science Colleges of Bharathidasan University region serve *do not influence* their ICT Knowledge.

- The variables viz., age, academic qualifications and professional qualifications of the teachers of the Arts and Science Colleges of Bharathidasan University region *influence* their ICT Skills.
- The variables viz., availability of personal computer at home, availability of internet connectivity at home, access to internet on mobile and participation in training programmes for integrating ICT into education, of the teachers of the Arts and Science Colleges of Bharathidasan University region *influence* their ICT Skills.
- The variables viz., length of computer experience, frequency of computer usage and length of internet experience of the teachers of the Arts and Science Colleges of Bharathidasan University region *influence* their ICT Skills.
- The variables viz., sex, designation and research qualifications of the teachers of the Arts and Science Colleges of Bharathidasan University region *do not influence* their ICT Skills.
- The variables viz., access to computer and internet connectivity at college and category of the institutions, where the teachers of the Arts and Science Colleges of Bharathidasan University region serve *influence* their ICT Skills.
- The variables viz., type, nature and locality of the institution and possession of ICT devices in the institution, where the teachers of the Arts and Science Colleges of Bharathidasan University region serve *do not influence* their ICT Skills.
- The variables viz., designation, academic, professional and research qualifications of the teachers of the Arts and Science Colleges of Bharathidasan University region *influence* their ICT Attitude towards the Use of ICT for Teaching and Learning.
- The variables viz., availability of personal computer at home, availability of internet connectivity at home, access to internet on mobile and participation in training programmes for integrating ICT into education of the teachers of the Arts and Science Colleges of

Bharathidasan University region *influence* their ICT Attitude towards the Use of ICT for Teaching and Learning.

- The variables viz., length of computer experience, frequency of computer usage and length of internet experience of the teachers of the Arts and Science Colleges of Bharathidasan University region *influence* their ICT Attitude towards the Use of ICT for Teaching and Learning.
- The variables viz., sex and age of the teachers of the Arts and Science Colleges of Bharathidasan University region *do not influence* their ICT Attitude towards the Use of ICT for Teaching and Learning.
- The variables viz., category, type, nature and locality of the institution access to computer and internet connectivity at college, where the teachers of the Arts and Science Colleges of Bharathidasan University region serve *influence* their ICT Attitude towards the Use of ICT for Teaching and Learning.

5.5. Discussion on the Findings and Conclusions

The findings and conclusions presented in the previous sections are discussed here, in the light of the findings of earlier researches for better understanding and deeper insights:

- The present study has come out with the finding that female teachers are better in their ICT Knowledge than male teachers, which is in line with the finding of Garcia–Valcarcel Munoz-Repiso et al., (2006) and contrary to the findings of Siann G. Macleod et al. (1990), Thomas H. Spotts et al. (1997) and Chaman Verma et al. (2015).
- The present study has come out with the finding that teachers of 24-34 age group are better in their ICT Knowledge than those of 35-45 and 46-56. It is in line with the findings of Kiruthika Ragupathi et al. (2007), Kourosh Fathi Vajargah et al. (2010), Saeed Ahmadi et al. (2011) and Pablo Cesar Munoz Carril et al. (2013).

- The present study has revealed that the type of institution in which the teachers are employed has no influence on their ICT Knowledge. It is in line with the findings of Yusuf Musibau Adeoya et al. (2013).
- The present study has come out with the finding that teachers who have computer access and internet connectivity at their institutions are better in their ICT Knowledge than the teachers, who do not have those facilities at their institutions. It is in line with the finding of Ijema Aniedi Archibong et al. (2010) and Oye et al. (2011).
- The present study has revealed that the teachers who have undergone training programme for integrating ICT into teaching are better in their ICT Knowledge than the teachers who have not undergone any such training. It is in line with the finding of Oye et al. (2011) and Fakhra Aziz et al. (2014).
- The present study has come out with the finding that the female teachers are better in their ICT Skills than male teachers, which is in line with the finding of Wong Su Luan et al. (2005), Garcia–Valcarcel Munoz-Repiso et al. (2006) and Khaleefeh Muflih (2011). It is contrary to the finding of Peter Waterworth (2008), Prachit Intaganok et al. (2008) and Gisela C. Jasmin-Siapno (2016) who found no significant difference between male and female in their ICT Skills.
- The present study has come out with the finding that the teachers of 24-34 age group are better in their ICT Skills than those of 35-45 and 46-56. It is in line with the findings of Kiruthika Ragupathi et al. (2007), Teresa Guash et al. (2009) and Gisela C. Jasmin-Siapno (2016).
- The finding of the present study is that the teachers of Science discipline are better in their ICT Skills than teachers of Arts and Humanities disciplines. It is in line with the finding of Al-Ansari (2006) and in contrary to the finding of Gisela C. Jasmin-Siapno (2016).
- The present study has come out with the finding that the teachers working in urban colleges are better in their ICT Skills than the teachers

working in rural colleges. Bincang (2009) found no such significant difference.

- The present study has revealed that teachers who have computer access and internet connectivity at their institutions are better in their ICT Skills than the teachers, who do not have those facilities at their institutions. It is in line with the finding of Prachit Intaganok et al. (2008) and Sattam Allahawiah et al. (2015).
- According to the present study teachers with computer and internet experiences for a period of 6 years and above are better in their ICT Skills than the teachers with lower experience span. It is in line with the finding of Al-Ansari (2006).
- The present study has found out that the teachers who have undergone training programme for integrating ICT into teaching are better in their ICT Skills than the teachers who have not undergone any such training. It is in line with the finding of Alcuin Mwalongo (2011).
- The present study has revealed that female teachers are better in their ICT Attitude than male teachers, which is in line with the finding of Ashok et al. (2016) and it is contrary to the finding of Mohamed Abdelaziz Elsaadani (2012). According to Charles P. Akpan (2014) sex has no influence on ICT Attitude.
- According to the present study, teachers of 35-45 age group are better in their ICT Attitude than those of 24-34 and 46-56. It is in line with the finding of Mohamed Abdelaziz Elsaadani (2013) and contrary to the finding of Jennings et al. (2001). According to Philip Olu Jegede (2009) age has no influence on ICT Attitude.
- The present study has found that the type of institution has no influence on the ICT Attitude of the teachers. It is in line with the finding of On Wuagboke et al. (2016) and Justin J.O. Ezeugwa (2016).
- The finding of the present study is that teachers of Science discipline are better in their ICT Attitude than teachers of Arts and Humanities

discipline. It is in line with the finding of Onasanya et al. (2010), Nadira Banu Kamal (2013) and Chandra Purkayastha (2015).

- The present study has found that there is a high positive correlation between ICT Knowledge and ICT Attitude. It is in line with the finding of Albirini A. (2006) and in contrast to the finding of Junhong Liu (2009).

5.6. Suggestions and Recommendations of the Study

On the basis of the findings of the study and the conclusions drawn thereof, the following recommendations are made:

- The Ministry of Human Resource Development and University Grants Commission should develop a clear policy and comprehensive plan of action with regard to training and retraining of Higher Education teachers, especially in ICT – Pedagogy Integration.
- The UGC should amend the structure of the Orientation and Refresher Courses, being offered by its HRDCs by including ICT Knowledge and Skills as integral component of these courses.
- The UGC can think of recognizing the Higher Education teachers who experiment and innovate with ICT in their teaching by allotting appropriate scores for the initiatives for inclusion in their Academic Performance Indicator.
- In addition to the Orientation and Refresher courses offered by UGC – HRDCs, a separate agency in the lines of SCERT for school teachers has to be established for the benefit of higher education teachers. Such centres should have exclusive focus on providing in-service training to teachers on the innovative models of teaching and learning, including ICT integration across all disciplines.
- The Central and State governments should work clear-cut policy frameworks for ICT in Education, as an add-on to the governments' ICT Policy.

- Both the Central and State governments should allocate sufficient funds for creating necessary ICT infrastructure in all the government and government-aided higher education institutions for helping teachers integrate ICT into their classroom teaching. Besides, there should also be a suitable mechanism for ensuring such infrastructure in the self-financing colleges.
- Both the governments shall institute annual awards for higher education teachers for their initiatives for ICT integration viz., Best ICT Integration Award with clear-cut norms for nomination and evaluation.
- The Bharathidasan University should form Information and Communication Technology Curriculum Integration (ICTCI) Task Force to enhance the ICT standard of the faculty and ensure availability of adequate technical infrastructure, in all of its affiliated colleges.
- The in-service training programmes currently being offered to higher education teachers in whatsoever form have to be restructured with more on hands-on session in the ICT laboratories so as to ensure acquisition of ICT Skills on the part of the participating teachers.
- The study recommends e-mentoring among academic staff with collaborative efforts in technology adoption within and among universities and inter-university institutions for professional development.

5.7. Suggestions for Further Research

"Every analysis ends with only a comma and not with a full stop" are the words of the great economist Alwyn. D. Marker while receiving the Best Economist Award – 1986, inviting further researches as follow ups to his work on 'Currency Value Excellence'. It is a known fact that, no research is complete by itself. Every study before its closure, starts another afresh by throwing light on the future possibilities for further exploration. It identifies

the areas left untouched. Thus every research underlines the locations of subsequent researches. This work is also not an exemption from this ever-existing phenomenon.

The findings of the present study open up the following ideas for further exploration by researchers of the future.

- The present study may be replicated, including the teachers of various departments of Bharathidasan University, so as to compare the Information and Communication Technology – Knowledge, Skills and Attitude (ICT-KSA) of the university teachers with that of the college teachers
- The present study can be replicated at the state level, involving the teachers of Arts and Science colleges of the entire state of Tamil Nadu in order to get a clear picture of the ICT-KSA of Higher Education teachers of the state. Such findings will help the administrators and policy makers decide upon the plan for increasing the ICT-KSA of the teachers in the state.
- If the present research is conducted as a country-wide survey, it would lead to a country report of India on the ICT-KSA of Higher Education teachers in the entire nation. Such a research can alone deal with the complexity of the idea 'ICT in Education' and 'Digital Learning', in context of Digital India Scheme of the Central Government. Further, such a study will also throw light on the outcomes of a massive initiative like NME-ICT in terms of teachers' ICT competencies.
- As this present study is quantitative with only questionnaire and scale as tools, further researches of mixed methodology involving interview and observation may be initiated, so as to get a quantitative and qualitative picture of the ICT-KSA of the Higher Education teachers.

5.8. Conclusion

The present study has focused its attention on the Information and Communication Technology Knowledge, Skills and Attitude of teachers of Arts and Science Colleges of Bharathidasan University. Though the sample was drawn from only the colleges, located in Bharathidasan University region, the findings and conclusions are generalizable to the population. Thus, the present study presents a holistic picture of the ICT-KSA of the higher education teachers of India. The findings and conclusions and their educational implications are of great significance in the context of the Government of India's flagship programmes for ICT in Education, under the 'Digital India' initiative.

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Appendices

APPENDIX – I

S.No.	NAMES OF THE COLLEGES
	GOVERNMENT COLLEGES
1.	Government Arts College, Karur.
2.	Government Arts College, Kumbakonam.
3.	H.H. The Rajah's College, Pudukkottai.
4.	Periyar E.V.R. College, Tiruchirappalli.
5.	Rajah Serfoji Government College, Thanjavur.
6.	Government Arts College for Women, Pudukkottai.
7.	Government College for Women, Kumbakonam.
8.	Kundavai Naachiyaar Government College for Women, Thanjavur.
9.	A.A. Government Arts College, Musiri.
10.	Government Arts College, Ariyalur.
11.	Government Arts College, Tiruchirappalli.
12.	M.R. Government Arts College, Mannargudi.
13.	Government Arts College, Ayyarmalai, Karur District.
14.	Thiru. Vi. Ka. Government Arts College, Thiruvarur.
15.	D.G. Government Arts College for Women, Mayiladuthurai.
16.	Government Arts and Science College, Peravurani, Thanjavur.
	AIDED COLLEGES
17.	A.V.C. College, Mannampandal, Mayiladuthurai.
18.	A.V.V.M. Sri Pushpam College, Poondi.
19.	Bishop Heber College, Tiruchirappalli.
20.	Jamal Mohamed College, Tiruchirappalli.
21.	Nehru Memorial College, Puthanampatti.
22.	Poompuhar College, Melaiyur.
23.	St. Joseph's College, Tiruchirappalli.
24.	A.D.M. College for Women, Nagapattinam.
25.	Holy Cross College, Tiruchirappalli.
26.	Seethalakshmi Ramaswami College, Tiruchirappalli.
27.	Dharmapuram Adhinam Arts College, Dharmapuram, Mayiladuthurai.
28.	Ganesar Senthamil College of Arts and Science, Melaisivapuri.
29.	Khadir Mohideen College, Adirampattinam.
30.	National College, Tiruchirappalli.
31.	Rajah's College, Thiruvaiyaru.
32.	S.K.S.S. Arts College, Thiruppanandal.
33.	T.B.M.L. College, Porayar.
34.	Tamilavel Umamaheswaranar Karanthai Arts College, Thanjavur.
35.	Urumu Dhanalakshmi College, Tiruchirappalli.
	UN-AIDED COLLEGES
36.	A.R.C. Viswanathan College, Mayiladuthurai, Nagapattinam.
37.	ABI & ABI College, Vayalur, Thanjavur.
38.	Adaikala Matha College, Arun Nagar, Vallam, Thanjavur.
39.	Annai College of Arts & Science, Kumbakonam.

40.	Annai Veilankanni Arts and Science College, Thanjavur.
41.	Arputha College of Arts & Science, Arputha Nagar, Vamban.
42.	Arungarai Amman College of Arts & Science, Aravakkurichi, Karur.
43.	Best Arts and Science College, Thenpathi, Sirkali Taluk, Nagapattinam District.
44.	Bharath College of Science & Management, South Garden, Thanjavur.
45.	Cambridge College of Arts and Science, Vettamangalam, Karur District.
46.	Christhu Raj College, Panjapur, Edamalaipatti Pudur, Tiruchirappalli.
47.	Dharmambal Ramasamy Arts & Science College, Orathanadu T.K. Thanjavur.
48.	Dr. Nallikuppusamy Arts College, Manakkarambai, Thanjavur.
49.	Edayathangudi G.S. Pillai Arts & Science College, Nagapattinam.
50.	Enathi Rajappa College of Arts & Science, Enathi Post, Pattukkottai.
51.	Imayam College of Arts & Science, Thuraiyur.
52.	J.J. College of Arts & Science, Namanasamuthiram, Pudukkottai.
53.	Kalaimahal College of Arts and Science, Sembanarkoil, Naagappatinam.
54.	Kongu College of Arts & Science, Deeran Chinnamalai Nagar, Karur.
55.	Kurinji College of Arts & Science, Green Ways Road, Tiruchirappalli.
56.	M.I.E.T. Arts College, Gundur, Tiruchirappalli.
57.	MASS College of Arts and Science, Kumbakonam.
58.	Mahatma Arts and Science College, Ariyur, Pudukkottai District.
59.	Maruthu Pandiyar College, Vallam, Thanjavur.
60.	Meenakshi Chandrasekaran College of Arts & Science, Pattukkottai.
61.	Meenakshi Ramasamy Arts and Science College, Udaiyarpalayam, Ariyalur.
62.	Modern Arts and Science College, Jayankondam.
63.	Naina Mohamed College of Arts & Science, Pudukkottai.
64.	Nethaji Subash Chandra Bose College, Thiruvarur.
65.	Paventhar Bharathidasan College of Arts & Science, Pudukkottai.
66.	Rajagiri Dawood Batcha College of Arts & Science, Papanasam, Thanjavur.
67.	Sadasivam Kathirkamavalli College of Arts and Science, Melavasal, Thiruvarur District.
68.	Swami Vivekananda Arts & Science College, Vallam, Thanjavur.
69.	Sri Sankara Arts and Science College, Asur, Kumbakonam.
70.	Sri Venkateshwara College of Arts & Science, Peravurani.
71.	Srimad Andavan Arts & Science College, Thiruvanaikoil, Tiruchirappalli.
72.	Srinivasan College of Arts and Science, Perambalur.
73.	Sudharsan College of Arts Science, Perumanadu, Pudukkottai.
74.	Swami Dayananda College of Arts & Science, Tiruvarur.
75.	Thanthai Hans Roever College, Perambalur.
76.	Valluvar College of Science and Management, Kodaiyur, Karur.
77.	Vivekananda Arts and Science College for Women, Sirkali, Nagapattinam.
78.	Aiman College of Arts & Science for Women, K. Sathanur, Tiruchirappalli.
79.	Annai Women’s College, Punnamchathiram, Karur.
80.	Auxilium College of Arts and Science for Women, Regunathapuram, Pudukkottai District.
81.	Bon Secours College for Women,Thanjavur.
82.	Cauvery College for Women, Tiruchirappalli.
83.	Chidambaram Pillai College for Women, Manachanallur, Tiruchirappalli.
84.	Dhanalakshmi Srinivasan College of Arts & Science for Women, Perambalur.

85.	Idhaya College of Women, Sakkottai, Kumbakonam.
86.	Mother Gnanamma Women's College of Arts and Science, Jeyankondam.
87.	Rabiammal Ahamed Maideen College for Women, Thiruvarur.
88.	Sengamala Thayaar Educational Trust Women's College, Mannargudi.
89.	Shrimati Indira Gandhi College, Tiruchirappalli.
90.	Sri Bharathi Arts and Science College for Women, Pudukkottai.
91.	Sri Sarada Niketan College of Science for Women, Karur.
92.	Sri Saradha College for Women, Perambalur.
93.	Chettinad College of Arts and Science, Tiruchirappalli.
94.	Swami Vivekananda Arts and Science College, Thanjavur.
95.	Sulthana Abdullah Rowther College for Women, Thiruvarur.
96.	S.K. College of Arts and Science, Vedaranyam.
97.	Jairams Arts and Science College, Karur.
98.	National Arts and Science College, Ariyalur.
99.	Subhashakthi College of Arts and Science for Women, Karur.
100.	Aadhavan Arts and Science College, Tiruchirappalli.
101.	Servite Arts and Science College for Women, Karur.
102.	Elizabeth College of Arts and Science, Perambalur.
103.	Sir Issac Newton Arts and Science College, Nagapattinam.
104.	Mother Terasa College of Arts and Science, Pudukkottai.
105.	Deen College of Arts and Science, Nagapattinam.
106.	Sri Suba Bharathi Arts and Science College, Pudukkottai.
107.	Navalar Na.Mu. Venkatasamy Nattar Thiruvarul Kalloori, Thanjavur.
108.	Uswathun Hasana Mamaji Haji Abdul Latheef Women's College, Karur.
109.	S.M.K. College of Arts and Science for Women, Thuraiyur.
110.	Annai Khadeeja Arts and Science College for Women, Pudukkottai District.
	UNIVERSITY CONSTITUENT COLLEGES
111.	Bharathidasan University Constituent Arts and Science College, Thiruvarur.
112.	Bharathidasan University Constituent Arts and Science College, Inamkulathur.
113.	Bharathidasan University Constituent Arts and Science College, Nagapattinam.
114.	Bharathidasan University Constituent College, Lalgudi.
115.	Bharathidasan University Constituent College, Perambalur.
116.	Bharathidasan University Model College of Arts and Science, Vedaranyam.
117.	Bharathidasan University Model College, Aranthangi.
118.	Bharathidasan University Model College, Thiruthuraipoondi.
119.	Bharathidasan University Constituent College for Women, Orathanad.
120.	Bharathidasan University Constituent Model Arts and Science College for Women, Veppur, Perambalur District.

APPENDIX – II

Index of Item Difficulty and Discrimination Index

Item No.	Index of Item Difficulty	Index of Discrimination	Item Selected/Not Selected
1	59	0.82	S
2	77	0.45	S
3	36	0.55	S
4	68	0.37	S
5	68	0.64	S
6	50	1.00	S
7	68	0.31	S
8	73	0.55	S
9	68	0.64	S
10	55	0.73	S
11	18	0.00	**NS**
12	59	0.45	**S**
13	5	-0.09	**NS**
14	50	0.81	S
15	55	0.55	S
16	59	0.82	S
17	89	0.31	S
18	13	0.09	**NS**
19	23	0.45	S
20	45	0.73	S
21	36	0.55	S
22	45	0.55	S
23	9	0.18	**NS**
24	32	0.64	S
25	18	0.38	S
26	9	0.18	**NS**
27	18	0.36	S

28	5	0.09	**NS**
29	23	0.18	**NS**
30	36	0.36	S
31	36	0.36	S
32	27	0.55	S
33	77	0.45	S
34	36	0.32	S
35	52	0.45	S
36	45	0.91	S
37	77	0.45	S
38	21	0.36	S
39	79	0.48	S
40	53	0.81	S
41	49	0.59	S
42	21	0.43	S
43	49	0.86	S
44	39	0.54	S

APPENDIX – III

List of ‘t’ Values for all the items in the ICT-SAS

Item No.	**‘t’**	**Item No.**	**‘t’**	**Item No.**	**‘t’**	**Item No.**	**‘t’**
1	4.307	32	8.774	63	11.217	94	12.475
2	**2.267***	33	8.308	64	8.250	95	13.001
3	9.093	34	9.347	65	8.396	96	9.528
4	7.814	35	9.164	66	8.905	97	9.678
5	10.250	36	9.164	67	8.819	98	11.787
6	12.785	37	**0.983***	68	7.873	99	9.784
7	18.873	38	7.660	69	8.217	100	16.372
8	7.319	39	10.073	70	8.362	101	**1.180***

9	6.200	40	11.175	71	9.524	402	**0.220***
10	8.943	41	10.977	72	8.444	103	14.3606
11	14.294	42	10.977	73	8.603	104	9.0718
12	10.482	43	11.919	74	11.381	105	5.7739
13	7.309	44	16.279	75	9.020	106	5.439
14	7.959	45	19.979	76	8.482	107	7.536
15	10.631	46	14.697	77	8.909	108	7.218
16	14.344	47	8.168	78	9.525	109	6.461
17	12.846	48	8.319	79	9.595	110	**1.856***
18	22.790	49	9.049	80	10.289	111	10.856
19	15.092	50	8.522	81	5.128	112	8.580
20	32.855	51	16.039	82	**1.432***	113	8.988
21	12.862	52	7.277	83	5.777	114	9.343
22	12.846	53	7.347	84	6.180	115	11.890
23	11.550	54	8.650	85	6.364	116	7.685
24	11.700	55	7.579	86	6.169	117	5.257
25	**1.024***	56	7.381	87	6.787	118	5.545
26	13.219	57	6.470	88	6.441	119	5.545
27	7.040	58	9.671	89	**1.713***	120	7.236
28	9.004	59	9.671	90	6.239	121	8.211
29	8.507	60	8.806	91	10.037	122	**0.989***
30	9.064	61	9.480	92	10.528	123	10.235
31	6.328	62	**2.144***	93	7.987	124	8.897

Items eliminated *

DEPARTMENT OF EDUCATIONAL TECHNOLOGY

BHARATHIDASAN UNIVERSITY

Respected Sir /Madam,

Greetings! I am pleased to introduce myself as a Ph.D. scholar at the Department of Educational Technology, Bharathidasan University. The topic of my research is "Information and Communication Technology: Knowledge, Skills and Attitude of Arts and Science College Teachers of Bharathidasan University Region". In this regard, I request you to respond to the enclosed research tools. I assure you that all the information provided by you will be handled with confidentiality and used only for the purpose of research. I request you to spare your valuable time for my research.

Thanking you,

Yours faithfully,

Dr. M. Jamal Mohamed Jaffar

GENERAL INFORMATION QUESTIONNAIRE
(Please fill in / tick appropriately.)

1. Name (Optional) :
2. Designation :
3. Sex : ☐ Male ☐ Female
4. Age :
5. Academic Qualifications: M.A. ☐ M.Sc. ☐ M.Com ☐
   Any other ☐ Please Specify: ___________
6. Professional Qualifications: B.Ed. ☐ M.Ed. ☐
   Any other ☐ Please Specify: ___________
7. Research Qualifications: M.Phil. ☐ Ph.D. ☐
8. Name and Address of the Institution: ________________________________
   ____
   ____
9. Category of the Institution: Government / Government-Aided / Self-Financing
10. Type of Institution: Men / Women / Co-Educational
11. Nature of Institution: Autonomous ☐ Non-Autonomous ☐
12. Locality of the Institution: Urban ☐ Rural ☐
13. Do you have a Personal Computer at home? Yes ☐ No ☐
    If yes, what type? Desktop ☐ Laptop ☐ Notebook ☐ Tablet ☐

14. Do you have Internet connectivity at home? Yes ☐ No ☐

If yes, what type? ☐ Broadband – Wired ☐ Broadband – Wireless
☐ Broadband – Datacard

15. Do you access the internet on your mobile?

Yes ☐ No ☐

16. What is your length of experience with the computer?

a)Less than 1 year b) 1-2 years c) 2-4 years d) 4-6 years e) 6 years and above

17. What is the frequency of your computer use?

a) Daily b) On alternate days c) Once in a fortnight or so
d) Once in a month or so e) Never

18. What is your length of experience with the internet?

a)Less than 1 year b)1-2 years c) 2-4 years d) 4-6 years e)6 years and above

19. What is the purpose of your web use?

a) E-mail b) Chatting c) On-line searches
d) Downloading academic content e) Teaching on-line
f) Entertainment like music or video g) Social Networking
h) Utility Services like Internet Banking, E-Payments etc.,
i) Others – Please mention:_______________________________________

20. Details of ICT devices available at your institution for facilitating learning

a) Over Head Projector b)LCD Projector c) Interactive White Board
d) Television e)DVD Player f) Public Address System

21. Do you have access to computer at college for facilitating learning?

Yes ☐ No ☐

22. Do you have internet connectivity at college for facilitating learning?

Yes ☐ No ☐ If yes, give details below:

23. Have you undergone any training programme for integrating ICT into teaching? Yes ☐ No ☐ If yes, give details below:

Sl.No	Training Programme	Duration	Organising Agency

24. Mention the problems faced by you in integrating ICT into the teaching learning process?

1)
2)
3)
4)
5)

25. Your Email ID: ______________________________ &

Your blog (or) website: ________________________

ICT KNOWLEDGE TEST (ICT-KQUEST)

GUIDELINES

You will find below 37 questions related to your Knowledge of ICT. Each question is followed by four options (viz., a, b, c and d), out of which only one is the right or most appropriate. Indicate your choice by tick marking the letter corresponding to the particular answer.

1) 1GB is equal to
   a) 1024 MB b) 1024 KB c) 1000 B d) 1000 KB
2) RAM stands for
   a) Random Awareness Memory b) Random Access Memory
   c) Random Actual Memory d) Random Activated Memory
3) PDF stands for
   a) Portable Digital Format b) Portable Document Format
   c) Portable Document File d) Portable Digital File
4) Power Point presentation needs
   a) Slide Projector b) OHP
   c) Film Strip Projector d) LCD Projector
5) MS Excel is mainly used for
   a) Documentation b) Printing
   c) Calculation d) Drawing
6) Debugging means
   a) Checking internet links b) Printing the output
   c) Checking errors in a program d) Entering Input
7) _________ is the heart of the computer.
   a) Central Processing Unit b) Storage Unit
   c) Arithmetic Logic Unit d) Printing Unit
8) __________ is the process of transferring files over the Internet to the computer
   a) Downloading b) Uploading
   c) Copying d) Broadcasting
9) HTTP refers to
   a) High Text Transfer Protocol b) Hyper Text Transfer Protocol
   c) Helical Text Transfer Protocol d) Heavy Text Transfer Protocol
10) Internet Explorer is a
   a) Hardware b) Browser
   c) Search Engine d) Website

11) URL stands for

a) Uniform Real Locator
b) Uniform Resource Locator
c) Unit Resource Locator
d) United Resource Locator

12) ISP stands for

a) Interactive System Protocol
b) International Safety Provider
c) Information Service Point
d) Internet Service Provider

13) The main advantage of e-dictionary is that it can

a) provide exact pronunciation of a word
b) provide a lot of examples
c) provide appropriate meaning(s) of a word
d) All the above

14) E-forum facilitates

a) discussion through internet
b) discussion through computer
c) discussion through TV
d) discussion through chat

15) The Internet is a

a) Network of Hypertext
b) Network of Networks
c) Network of Websites
d) Network of Web Pages

16) Modem is the abbreviation for

a) Modulator demodulator
b) Moderator demoderator
c) Module demodule
d) Moderator demonstrator

17) LAN stands for

a) Line Area Network
b) Live Area Network
c) Local Area Network
d) Link Area Network

18) Mosaic is

a) a file transfer protocol
b) a web browser
c) a web designer
d) an antivirus

19) The minimum number of letters required to develop a secured password is

a) 4
b) 6
c) 8
d) 10

20) Which among the following is not a browser?

a) Mozilla Fire Fox
b) Safari
c) Yahoo
d) Chrome

21) Blogs are

a) Websites
b) Software
c) Web Pages
d) Programs

22) Hot Potatoes are a set of

a) Programs
b) Softwares
c) applications
d) websites

23) Skype is a tool for
  a) internet telephony b) social media
  c) video sharing d) audio sharing
24) Podcasts are
  a) Multimedia files b) audio files
  c) video files d) Images
25) One who authors and maintain a blog is
  a) blog author b) blog provider
  c) blog master d) Blogger
26) Wiki provides
  a) audio tutorials b) editable content
  c) video tutorials d) peer tutorials
27) Updates about the content of the website are delivered to the users through
  a) Blogs b) RSS Feeds
  c) Podcasts d) Wikis
28) Pickout from the following the URL of the blog
  a) www.eltinindia.worldpress.com b) www.eltinindia.com
  c) www.eltindia.org d) www.eltindia@blogger.com
29) Hot Potatoes can be used for
  a) Teaching b) Lesson Planning
  c) Testing d) Scheduling
30) Which one of the following is not available in wiki format?
  a) Books b) Dictionary
  c) Maps d) Videos
31) Web 2.0 refers to
  a) the second version of the web b) the second generation of the web
  c) the second model of the web d) the second type of the web
32) Face book is an
  a) e book b) an audio book
  c) a google app d) a social network site
33) Hot Potatoes are available for
  a) Purchase only b) Freedown load
  c) Institutional Purchase only d) Business Purchase Only
34) MOOC stands for
  a) Mobile Open Online Course b) Massive Open Online Course
  c) Management Open Online Course d) Multimedia Open Online Course

35) Users can post on the social networking sites

a) photographs
b) music
c) videos
d) all the above

36) Which one of the following is not an element of multimedia?

a) tables
b) animation
c) video
d) text

37) MP3 is an extension of _________ file.

a) Audio
b) Video
c) Presentation
d) Text

ICT SKILLS ASSESSMENT SCALE (ICT-SAS)

GUIDELINES

You will find below a set of ICT skills, grouped under several categories. For each skill, you will have to record your response i.e., your level of confidence with regard to that particular skill. For recording your level of confidence against the items, please use the 1-5 scale provided. The meaning of these numbers is as follows:

1 - I am not aware of this application/function/operation.

2 - I am aware of this function/operation but not experienced in using/implementing it

3 - I have used/done this occasionally but need practice/training to be confident.

4 - I am a regular and confident user of this application/operation.

5 - I am fully competent with this application/operation and could confidently explain it to others.

ICT SKILLS

Computer Management

• locate and run a program (software application)	1 2 3 4 5
• use CD-ROM-based software	1 2 3 4 5
• organise your electronic files into folders	1 2 3 4 5
• search for files on the computer system	1 2 3 4 5
• move/copy files between drives (e.g. from D: to E:)	1 2 3 4 5
• backup files onto various media types (CD-RW, USB Hard drive etc)	1 2 3 4 5
• print to various networked printers	1 2 3 4 5
• delete files / programs	1 2 3 4 5

Computing Hardware and Environment

• connect up the computer and its peripherals (mouse, keyboard, monitor, iPad etc.)	1 2 3 4 5
• use a scanner for copying images	1 2 3 4 5
• use a digital camera for capturing images and upload	1 2 3 4 5
• use a digital camera for capturing moving images and upload	1 2 3 4 5

Word Processing (e.g. Microsoft Word and Pages)

• use a simple editing e.g. bold, italics, centering, font size etc.	1 2 3 4 5
• use a spellchecker	1 2 3 4 5
• import text and images into a word processed document	1 2 3 4 5
• include tables in a document	1 2 3 4 5
• insert a hyperlink	1 2 3 4 5
• alter the layout and positioning of text and images	1 2 3 4 5
• use templates for standard documents	1 2 3 4 5
• create new document templates	1 2 3 4 5
• divide the page layout into columns	1 2 3 4 5
• use headers and footers	1 2 3 4 5
• use the drawing tools to create shapes and Autoshapes	1 2 3 4 5
• mail merge	1 2 3 4 5
• print a document (change colour options, page size, layout etc.)	1 2 3 4 5
• save a document in various file formats	1 2 3 4 5

Spreadsheets (e.g. Microsoft Excel and Numbers)

• input data in rows and columns	1 2 3 4 5
• auto filling series	1 2 3 4 5
• sort data	1 2 3 4 5
• input formulae	1 2 3 4 5
• replicate formulae along rows/columns	1 2 3 4 5
• produce charts and graphs for data analysis	1 2 3 4 5
• add headers and footers	1 2 3 4 5
• print a selected area	1 2 3 4 5
• password protect a spreadsheet	1 2 3 4 5

Presentation (e.g. Microsoft PowerPoint and Keynote)

• create a basic presentation package	1 2 3 4 5
• add clipart to slides	1 2 3 4 5
• modify colours of text, background, lines	1 2 3 4 5
• change the layout of slides	1 2 3 4 5
• introduce animation onto slides	1 2 3 4 5
• add sound to slides	1 2 3 4 5
• insert a hyperlink	1 2 3 4 5
• modify transition between slides	1 2 3 4 5
• edit a master slide	1 2 3 4 5
• incorporate a data chart or graph	1 2 3 4 5

- rearrange slides within a presentation 1 2 3 4 5
- change slide timings and presentation options 1 2 3 4 5
- produce appropriate handout formats 1 2 3 4 5

Using the Interactive Whiteboard

- orient / align the whiteboard 1 2 3 4 5
- alter the settings e.g. pen size/colour/rubber size 1 2 3 4 5
- use the keyboard function 1 2 3 4 5
- use the right mouse button function 1 2 3 4 5

Using the Internet

- access an Internet site via its website address 1 2 3 4 5
- use search engines to find information 1 2 3 4 5
- use safe searching options 1 2 3 4 5
- save/use bookmarks / favourites for making sites 1 2 3 4 5
- download files from the internet 1 2 3 4 5
- save text and images from web pages 1 2 3 4 5

E-mail

- send and receive e-mail messages 1 2 3 4 5
- attach files to outgoing e-mails 1 2 3 4 5
- open and save files attached to incoming e-mails 1 2 3 4 5
- forward e-mails to selected contacts 1 2 3 4 5
- create new contacts in address book 1 2 3 4 5
- create a distribution list of contacts 1 2 3 4 5
- sort messages and files in created folders 1 2 3 4 5
- search for a particular e-mail to attachment 1 2 3 4 5

Multimedia

- use a program to play video and sound 1 2 3 4 5
- import video/images from a digital camera or digital video camera 1 2 3 4 5
- general use of a digital camera and a video camera 1 2 3 4 5
- edit images using Paint 1 2 3 4 5
- edit videos using Windows Moviemaker 1 2 3 4 5
- record audio using Audacity and upload to the internet 1 2 3 4 5
- download video clips from videosharing sites like Youtube 1 2 3 4 5
- upload video clips to videosharing sites likeYoutube 1 2 3 4 5
- create and edit a slide presentation 1 2 3 4 5
- use Windows Moviemaker (or other video/movie production software) to enhance learning. 1 2 3 4 5

Using Web 2.0 Tools

• set up a wiki space for your students	1	2	3	4	5
• use a wiki for facilitating learning	1	2	3	4	5
• set up blogs for your students	1	2	3	4	5
• use a blog/s for facilitating learning	1	2	3	4	5
• use Podcasts for facilitating learning	1	2	3	4	5
• create a class group using Google / Yahoo Groups	1	2	3	4	5
• use on line collaboration tools	1	2	3	4	5
• use social bookmarking tools	1	2	3	4	5

Lesson Planning

• understand advantages and disadvantages of using ICT	1	2	3	4	5
• compare different software packages for a specific purpose	1	2	3	4	5
• prepare classroom lectures with on-line demos	1	2	3	4	5
• prepare presentations and handouts using PowerPoint	1	2	3	4	5
• use graphical images in lesson preparation	1	2	3	4	5
• prepare the classroom/computer suite for an ICT lesson	1	2	3	4	5

Teaching and Delivery

• teach ICT skills to students	1	2	3	4	5
• organise and manage the use of ICT in the classroom	1	2	3	4	5
• teach whole class lessons using ICT	1	2	3	4	5
• extend students' learning in a subject through the use of ICT	1	2	3	4	5
• incorporate ICT links across the curriculum	1	2	3	4	5
• pose questions to stimulate students and direct them when they are using ICT	1	2	3	4	5
• provide a list of relevant web sites for topic areas	1	2	3	4	5
• include web portals in learning activities	1	2	3	4	5
• encourage students to use the learning platform for lessons/homework	1	2	3	4	5
• use an LCD projector for content delivery	1	2	3	4	5
• encourage students to use e-mail for academic clarifications and submissions	1	2	3	4	5
• use the blogs / free websites to publish support material for lessons	1	2	3	4	5
• use the blogs / free websites to post lecture notes and handouts	1	2	3	4	5
• moderate discussions on subject topics among class groups	1	2	3	4	5
• use on-line / downloaded academic videos in the class	1	2	3	4	5
• use multimedia learning materials in the class	1	2	3	4	5

Assessing & Evaluating

• assess students ICT capability	1	2	3	4	5
• assess the contribution ICT has made to the learning of a subject	1	2	3	4	5
• judge how the use of ICT can alter expectations of students' attainment.	1	2	3	4	5
• judge the effectiveness of using ICT in achieving teaching objectives	1	2	3	4	5
• get students to submit assignments in electronic format	1	2	3	4	5
• create tests in electronic format	1	2	3	4	5
• share tests in electronic format through e-mail	1	2	3	4	5
• use web-based tests for assessing the students' achievement	1	2	3	4	5

Attitude towards the Use of Information and Communication Technology (ICT) in Teaching Scale (ATUITS)

GUIDELINES

This scale consists of 37 statements and it provides five points bearing the headings Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA), Strongly Disagree (SD), against the statements. Read each statement carefully and place a (✓) mark against it in the appropriate column. You are requested to give responses to all the statements. There is no time limit but you have to record your response immediately after reading the statements.

S. No.	STATEMENTS	SA	A	UD	DA	SDA
1.	I am afraid of using computer in teaching.					
2.	The Use of ICT skills in teaching will lose one's observational skill.					
3.	I like to make use of e-books in teaching.					
4.	The use of online resources in teaching will make the students appreciate the uniqueness of man in this universe.					
5.	E-contents are not advantageous when compared to printed content in teaching.					
6.	I like to visit IT parks in nearby places along with my students.					
7.	I prefer to transfer e-documents through Bluetooth device.					
8.	I use interactive board in teaching only to show my expertise in it.					

S. No.	STATEMENTS	SA	A	UD	DA	SDA
9.	I wish to receive class notes through e-mail.					
10.	E-mailing the notes to all of my students in a class is a difficult task.					
11.	I do not like to use power point presentation in teaching.					
12.	Money spend on developing hi-tech class room is a waste.					
13.	I like to use the MS Excel software to draw graph in my classroom teaching.					
14.	Online educational programs are always expensive.					
15.	I do not want the students to make use of Internet with respect to their learning.					
16.	Online teaching does not help the students in co-operative living in society.					
17.	I hate seeing electronic exhibition.					
18.	Referring to the e-journals in education will strengthen the learners ability to do research.					
19.	I do not like to waste money in purchasing electronic devices for teaching.					
20.	Since the lack of technical knowledge of Internet, I do not use it while teaching.					
21.	Teaching with the help of a computer will be the most effective method than the traditional method of teaching.					
22.	I do use Web based activities in my teaching.					
23.	Teaching with the help of electronic resources will make teaching mechanical.					

S. No.	STATEMENTS	SA	A	UD	DA	SDA
24.	I am comfortable in using e-dictionaries in teaching.					
25.	Use of Internet in teaching will make teaching effective.					
26.	I like to develop innovative teaching with the help of ICT devices.					
27.	Use of mobile devices in teaching will de-humanize the learners.					
28.	I feel reading through e-book reader is a strain to my eyes.					
29.	I feel sorry for having introduced new technology in teaching.					
30.	We learn to respect the ideas of others in making use of internet in teaching.					
31.	I am bored by the use of search engines in teaching.					
32.	Use of e-resources in teaching develops in one perseverance.					
33.	I like very much doing calculations in MS Excel while teaching.					
34.	Implementation of computer in teaching may replace the teacher.					
35.	I think that fruitful results can be got through online discussions.					
36.	The use of electronic gadgets in teaching makes one develop confidence.					
37.	I do not think that e-journals facilitate research in teaching.					

Thank you for sparing your valuable time!